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# Annuities in Switzerland

*Monika Bütler*
*Martin Ruesch*

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## Abstract

Switzerland's pension system has attracted considerable attention, mainly due to its reliance on a three-pillar structure. A relatively small pay-as-you-go system (first pillar) is complemented by a mandatory, employer-based, fully funded occupational pension scheme (second pillar). The main goal of this paper is to provide a detailed description and analysis of the Swiss pension system. Particular emphasis is placed on the second pillar and its role in the provision of old age benefits within the Swiss social security system. The paper shows, for example, that a typical individual with an uninterrupted career can expect a net (after-tax) replacement rate of at least 70 percent. Occupational pension plans are highly regulated. Minimum interest rate requirements and minimum conversion rates (at which the accumulated retirement balances are transformed into annuity streams) introduce many elements of defined benefit plans into notionally defined contribution schemes. The resulting money's worth ratios are very high (with the exception of single males). Switzerland also has a high annuitization rate by international standards (approximately 80 percent). However, due to high fragmentation of the scheme and non-uniform accounting practices, some aspects of the system are not very transparent. The paper sheds light on the financial health of the pension system and the evolution of the regulatory framework in the past two decades.


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This paper—a product of the Financial Policy Division, Financial Systems Department—is part of a larger effort in the department to contribute to the research on the payout phase of defined contribution pension systems. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The program manager of the project may be contacted at rrocha@worldbank.org.

# Annuities in Switzerland

**Monika Bütler and Martin Ruesch** [1]

[1] The authors are from St. Gallen University, Switzerland. The authors are grateful to Roberto Rocha and Dimitri Vittas for comments and suggestions on earlier drafts.

## PREFACE

This paper on the Swiss annuities market is part of a broader project on annuities, coordinated by Roberto Rocha, program manager in the unit for Financial Markets for the Social Safety Net, of the Financial and Private Sector Development Vice-Presidency of the World Bank. The project was initiated in 2004 to fill an apparent gap in the pensions literature, especially in the literature addressing the payout phase of defined contribution pension systems. Many countries that have implemented systemic pension reforms and introduced private pension systems are now facing the challenge of organizing the payout phase for retiring workers. Organizing the payout phase entails introducing a well-regulated market for retirement products, which involves the effective regulation and supervision of retirement products, marketing activities, and intermediaries. However, the literature on the payout phase is generally focused on a few countries and topics, and does not address in sufficient detail the institutional and regulatory issues faced by policy-makers in reforming countries.

The World Bank project fills the gap by reviewing in detail a number of representative country cases, including Australia, Chile, Denmark, Sweden, and Switzerland. These countries have large private pension systems operating primarily on a defined contribution basis and have already entered the payout phase. Moreover, their institutional and regulatory arrangements for the payout phase are different in many aspects, including decentralized and centralized arrangements for the provision of annuities, different menus of retirement products, different approaches to price regulation and risk-sharing, different marketing rules, and different capital rules for providers. Therefore these countries provide a rich variety of experiences and policy lessons for other reforming countries.

Switzerland has a large mandatory second pillar that operates on a defined contribution base, although with minimum return guarantees. It has achieved a high degree of annuitization in the payout phase, due in good part to restrictions on lump-sums. The provision of annuities is decentralized, as in countries like Chile and Denmark, with many private and public pension funds offering annuities, but the pricing of annuities is regulated. The Swiss case study shows that price regulation has ensured good outcomes for pensioners but also entails challenges for the providers, especially when regulation fails to follow market developments.

## Table of Contents

**FIGURES**

**TABLES**

# I. INTRODUCTION

Switzerland's pension system has attracted considerable attention, mainly due to its reliance on a three-pillar structure. A relatively small (and for European standards, recent (1948)) pay-as-you-go system is complemented by a strong and mature fully funded occupational pension pillar. Although the latter was mandated only 20 years ago (1985), employer-based pensions have a long history, which is still reflected in the large fragmentation of the second pillar. Tax-favored savings instruments constitute the third pillar.

The second pillar in Switzerland is based on occupational pensions, mandated by law, but organized by employers. There are several possible organizational forms, the two polar cases being an autonomous pension fund, on the one hand, and a contract with an insurer, on the other. The accumulation of retirement assets and their withdrawal as annuities (or, more recently, as capital) are usually organized by the same pension provider. The strong link between the accumulation and decumulation phases is an important feature of the Swiss system. It may explain some of the surprising facts of the scheme, such as its stability and the high annuitization rates.

The institutions that implement occupational pension schemes according to the terms of the BVG/LPP[2] must be registered. The managing body must include as many representatives of employees as of employers, having the same rights. This type of governance using joint management is one of the key characteristics of the Swiss system. It may be one of the reasons for its stability.

The BVG/LPP law specifies minimum requirements along several dimensions. While a regulation of the contribution rates and certain restrictions on pay-out options are not uncommon in an international context, the law also mandates the minimum interest rate for old age credits and the conversion factor at which the accumulated pension capital has to be translated into a life-long annuity. The pension funds also have to meet certain requirements on the degree of funding, their investment structure, as well as on transparency issues. There is little regulation (and even less reliable representative data) on the asset and liability management of the different pension funds.

There is a vivid debate concerning the current legal conversion factor, at which the accumulated pension capital has to be converted into a life-long annuity. The current annuity conversion factor (7.2 percent to be reduced to 6.8 percent over the next ten years) does not reflect market conditions and survival rates anymore, and thus potentially threatens the sustainability of the system. As will be shown in the chapter on Money's Worth Ratios, the statutory conversion factor seems too high given the mortality structure of the population.

[2] BVG = "Berufliches Vorsorge-Gesetz" (Occupational Benefit Plan) in German, LPP = "Loi sur la Prévoyance Professionnelle" in French.

The Swiss pension law allows for deviations from the regulations under certain, relatively vague, conditions for independent pension funds (i.e., those directly managed by the employer). Insurance companies are subject to stricter rules. The independent pension fund can, for example, credit a lower interest rate if it is under-funded. More importantly, it allows the application of a lower conversion factor, if the additional resources are used to index annuities or to finance other (early) retirement benefits, or if the minimum requirements can be met by alternative measures, such as an accrual rate that exceeds the minimum interest rate requirement during the accumulation phase. These features, together with the governance structure of the funds, may explain why—despite the strong (and not always sound) regulation—the majority of pension funds are financially healthy, i.e., are sufficiently funded. There is considerable room for maneuvering for the independent pension funds, which makes it difficult to assess the performance of the system as a whole.

Given that the level of annuitization within the first and second pillar of old age provision is very high, there is little scope for additional market-priced annuities. While there is full annuitization in the first pillar, the average degree of annuitization in the second pillar is approximately 80 percent. For most individuals covered by the second pillar, the purchase of an additional annuity does not make sense, as the conditions within the occupational pension system are in general considerably more favorable. As a consequence, the vast majority of the large volume of annuities in Switzerland is not priced in the market.

The law requires the same conversion factor for men and women, single and married individuals, at least within the mandated part of the second pillar. Married people thus benefit from a free component in the implicitly joint- and survivor annuities. The uniform conversion factor leads to high differences in MWRs between different groups of the population. On average a married man, for example, receives approximately 25 percent more in expected terms than a single man.

Taking the first and second pillar together, an individual with an uninterrupted work career (which is, for men, not unusual for Switzerland) is well prepared for retirement. At an average wage and an average annual wage growth of 2 percent, the specified minimal criteria in the Occupational Benefit Plan (BVG 1985) achieve a second pillar replacement rate of 50 percent based on the final insured salary.[3] This is also the customary target replacement rate specified by most pension funds. Together with the benefits from the second pillar, the effective gross replacement rate amounts to approximately 65 percent of the final wage (net of taxes approximately 75 percent).[4] It is thus not surprising that the elderly Swiss do well on average and that poverty among them is rare. Moreover, the tendency to retire early might also reflect the generosity of the system at all income levels covered by the second pillar.

For future generations, however, the picture may look less bright. In addition to unfavorable demographics threatening the financial viability of the first pillar, the current

[3] As will be explained later, the final insured salary is the gross salary exceeding a threshold level that is assumed to be covered by the first pillar.

[4] If a person has minor children at retirement he gets additional benefits from both pillars. Taking into account that taxes are progressive, the net replacement rate can be well above 100 percent.

minimal requirements specified in the occupational pension law will not be sustainable given the dramatic increase in longevity and the fall in market returns (that are likely to be exacerbated by demographic change). While individual pension funds are given some margin to adjust the legal requirement (and do so very often in practice), insurance companies face stricter regulation. Unless the requirements are adjusted to updated mortality tables and market conditions, pension funds and insurance companies will face considerable financial difficulties. Already today the large insurance companies, which are crucial in the well-functioning of the second pillar, seem to lose interest in providing services within the mandatory part of the system.

### 1.1 The Purpose and Structure of the Paper

The main goal of this paper is to analyze the Swiss occupational pension pillar, with particular emphasis on the rate of annuitization and the value of second-pillar annuities. The paper primarily examines the structure of the second pillar, and its role in the provision of old age benefits within the Swiss social security system. It also sheds light on the financial health of the system, the value of pension benefits for insured workers, and the evolution of the regulatory framework in the last two decades.

The second chapter offers an introduction to the Swiss old-age provision with a particular focus on the second pillar. It also specifies the legal requirements concerning the minimum interest rate and the conversion factor at which the accumulated capital is translated into a life-long annuity. The chapter also discusses early retirement and the choice between an annuity and a lump sum payment.

More details about the most important regulatory issues are discussed in the third chapter. Not surprisingly, the combination of a minimum return requirement during the accumulation period with a direct regulation of the benefit conversion rate is puzzling. As will be shown, the Swiss system operates with two different interest rate concepts, a more short-term rate for the accrual phase, and a more long-term rate for the computation of benefits and funding ratios. Other aspects discussed in this chapter include investment and capital regulations as well as transparency issues.

In the fourth chapter, the values of the second pillar annuities are estimated using the regulated structure of these benefits. The computation of the annuities' values is shown to be complicated by a number of factors inherent in the Swiss system. Given the traditionally low risk-free interest rate, the choice of the appropriate discounting schedule is not innocuous. Moreover, the flexibility in the design of the pension plan makes comparisons between different plans difficult.

Chapter five describes in more detail the organizational structure of the second pillar, as well as recent funding problems. Even more than the preceding chapters it suffers from the difficulty to get reliable and representative data of the highly fragmented Swiss system.

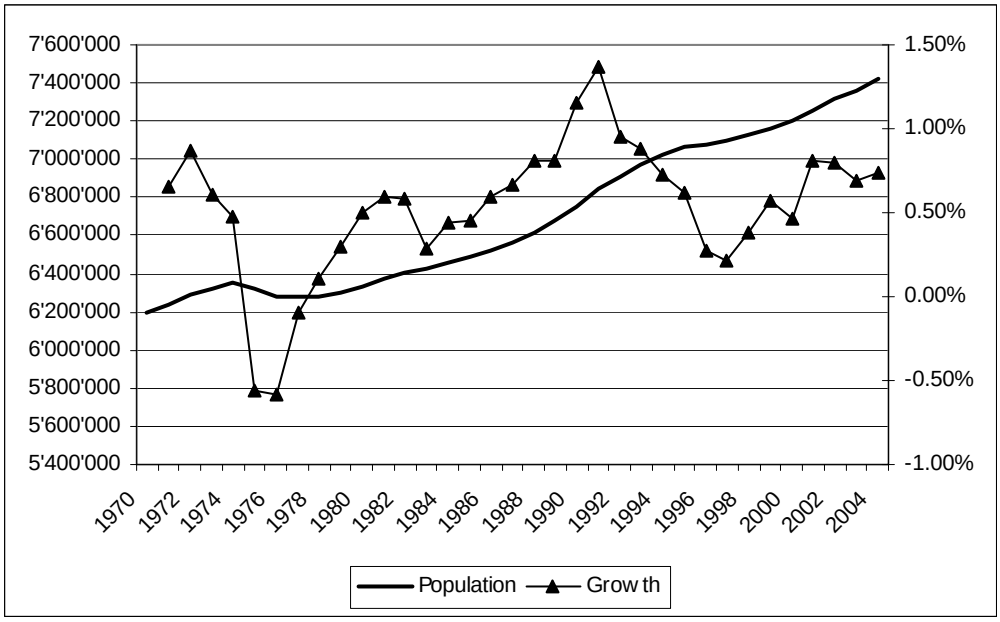
The voluntary, but tax-favored third pillar, and the system’s major risks are analyzed in chapters six and seven. Chapter eight summarizes the main findings and concludes.

We think that Swiss experience is useful for the design of occupational pension pillars and their regulation. The main caveat of our analysis is the difficulty in obtaining representative and reliable information along several important dimensions, such as the asset and liability management of pension funds. Due to the high fragmentation of the second pillar (several thousand individual funds), it is very difficult to obtain a good overview of the (financial) situation of occupational pension schemes, as well as of the value that present and future annuitants get out of the system.

## 1.2 Empirical Background: Demographics

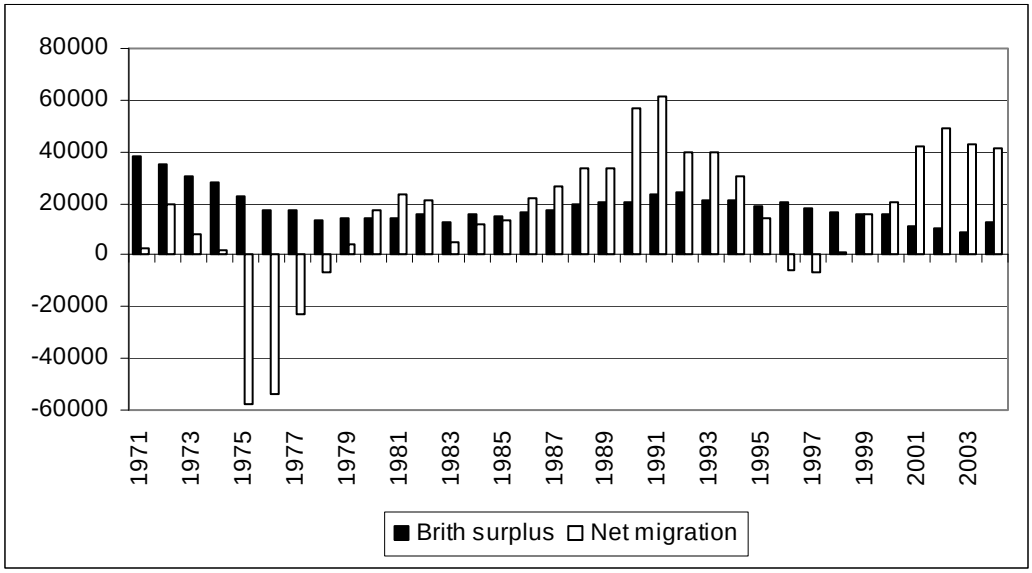
As most industrialized countries, Switzerland experienced a baby boom and a subsequent decline in birth rates to very low levels. It also witnessed a high level of immigration leading to a 20 percent share of foreigners in the resident population. Figure 1 depicts the size of the population and its growth rate since 1970. High immigration and a net birth surplus until the mid-1970s was followed by a negative migration balance as a consequence of the oil shock recession (see also Figure 2). Immigration has accounted for approximately 80 percent of the population growth rate in recent years. Long-term projections on population growth and the age structure of the economy are thus difficult to make, especially as migration is also related to the Swiss business cycle and immigration policy. The recent opening of the Swiss labor market to citizens of EU accession countries, for example, has led to a new inflow of immigrants.

**Figure 1 Population and its Growth Rate**




Source: Bundesamt für Statistik (2005, August), p.4 and Bundesamt für Statistik (2004, August), p.6

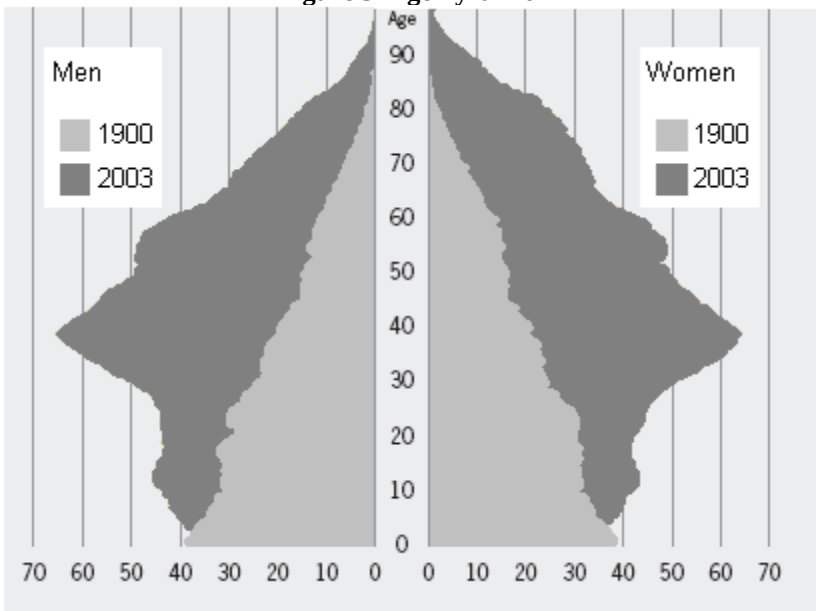
**Figure 2 Birth Surplus and Migration since 1971**




Source: Bundesamt für Statistik (2005, August), p.4 and Bundesamt für Statistik (2004, August), p.6

Figure 3 depicts the current age distribution for Switzerland. As in many other countries, Switzerland has experienced a strong decline in the number (and fraction) of children and a dramatic increase in the number of retired individuals. The inversion of the age pyramid is likely to persist unless the current low fertility rate substantially increases.

**Figure 3 Age Pyramid**

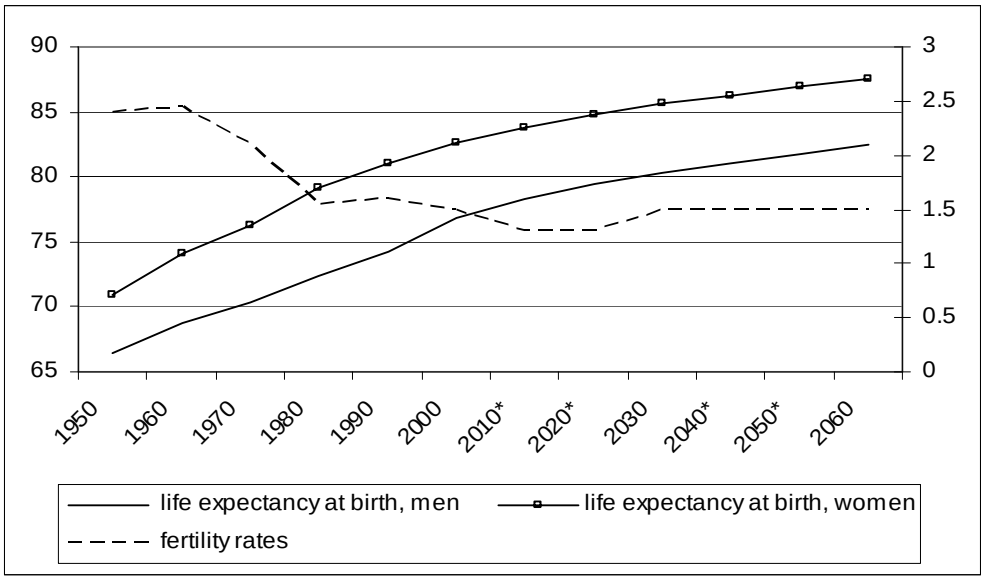



Source: Bundesamt für Statistik (2005), p.34, Fig. 1.2

A dramatic increase in life expectancy over the last decades has exacerbated the impact of lower fertility rates for the viability of the social security system (see Figure 4). As a consequence, there has been a considerable shift in the relative size of different age groups as shown in Figure 5. The old-age dependency ratio (defined as the number of people over

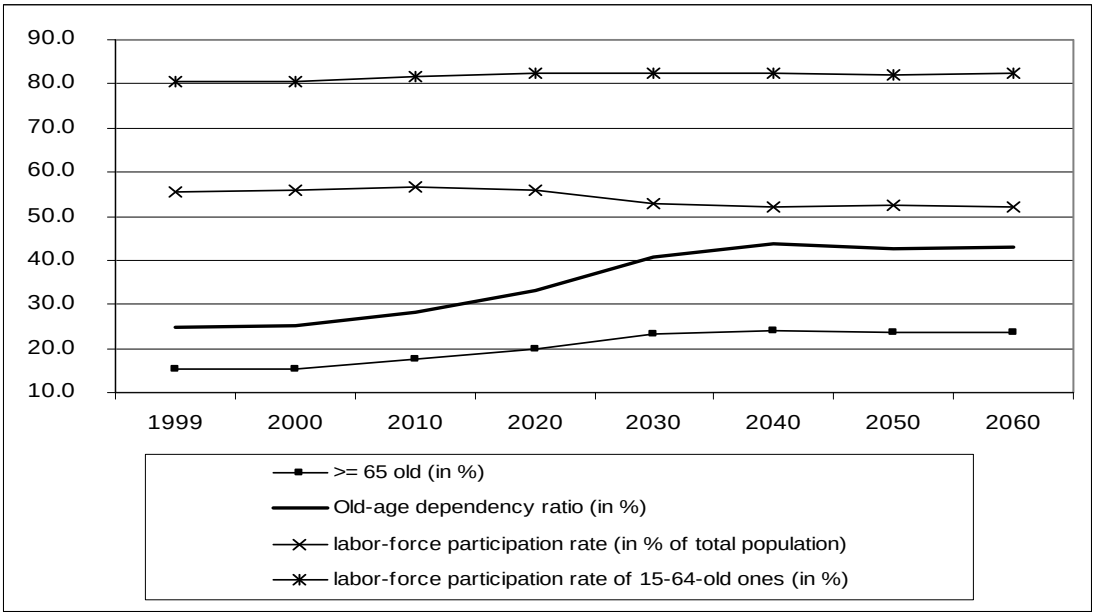
65 divided by those aged 20–64) is anticipated to increase from 25 percent today to almost 45 percent in the year 2035[5] . Demographics will also affect the age composition of the electorate. The age of the median voter, for example, will increase to approximately 52 until 2025. The factual veto right of the population will put tight limits on politically feasible reform of the pension system.

**Figure 4 Life Expectancy and Fertility Rates**




Source: Bundesamt für Statistik (2005), p.36 and p. 103

**Figure 5 Projected Dependency Ratios and Labor Force Participation Rates**




Source: Bundesamt für Statistik (2005), p. 100

[5]Foreign immigrants, which make up approximately 20 percent of the work force, are net contributors at present. An increase in immigration is not really considered an option due to political resistance and the fact that the fertility rate of second generation immigrants is very close to that of Swiss citizens.

## II. THE SWISS PENSION SYSTEM

Switzerland was the first OECD country that mandated an occupational pension scheme (in 1985) as the second pillar to complement a pay-as-you-go (PAYG) system (introduced in 1948). This section provides an overview of the most salient features of the Swiss pension system with an emphasis on the old-age component. Both the first and second pillars have an embedded disability insurance, which is also briefly explained in section 2.5.[6]

### 2.1 The First Pillar

#### *2.1.1 Overview*

The first pillar, the so–called AHV[7] , is a pay-as-you-go (PAYG) system. It was introduced after a very successful political referendum in 1948[8] . It aims at providing a basic subsistence level of income to all retired residents in Switzerland.

The main features of the first pillar can be described as follows: Although there is a small trust fund, the public pension system is a pay–as–you–go system, in which the current young have to finance the pensions of the current old. The system is financed mainly with a proportional payroll tax on all labor income (see below), and an earmarked fraction of the value added tax on consumption. By law, 20 percent of total expenditures have to be financed out of general federal government revenues.

For a long time, the first pillar has been viewed as considerably stable, efficient (at reducing poverty in old age) and cheap (due to very low administration costs, approximately 0.33 percent of benefits). But as most PAYG systems in Europe, the Swiss first pillar is plagued by unfavorable demographics due to increases in longevity and low fertility rates, which have led to a strong rise in the old–age dependency ratio. If the current levels of contributions and benefits are left unchanged the present value of future contributions falls short of the present value of future claims by about a third. There are virtually no reserves — the AHV trust–fund covers less than one year's worth of benefits (c.f. Table 1) — to cushion the anticipated population aging. Table 1 presents the revenues and expenditures of the first pillar (forecasted numbers after 2004). After 2008, the first pillar will be in deficit with an annual funding gap reaching almost 1 percent of GDP in 2015.

There is no consensus in the current political debate as to how to fix this financing problem. Swiss policy makers face strong political constraints for potential reforms. Any change of the law can be (and usually is) challenged by an optional referendum. Thus, the public possesses veto power for all reforms of the current social security system. This is

[6] For a comparative analysis of pension systems across countries refer to OECD (2005).
[7] AHV = Alters– und Hinterbliebenen–Versicherung (old age insurance).
[8] Changes to the law are subject to an optional referendum in Switzerland. In Switzerland, 50'000 voters (approximately 1 percent of the electorate) can request a public vote regarding law changes previously decided by the federal parliament.

crucial as the median voter, who is approximately 48 today, is anticipated to have an age of 52 by the year 2025.

Revisions of the first pillar in the year 2000 have led to a number of important structural changes. Firstly, family/household benefits have been replaced by *individual benefits*. Secondly, individuals with responsibilities for children up to 16 years or other dependants are now entitled to *child care credits*. Thirdly, contributions during marriage, including child care credits, are split between the spouses. This change led to a substantial improvement for divorced women, but reduced the entitlements of couples with a non–working spouse and no children. Fourthly, the legal retirement age for women has been raised stepwise from 62 to 64 years, and most probably, it will be further raised to 65.

**Table 1 AHV: Revenues, Expenditures and GDP (in millions) explored until 2015**

| Year | Total Revenues | Total Expenditures | Gap | AHV Fund | Nominal | Expenditures as % of GDP | Gap as % of GDP |
|---|---|---|---|---|---|---|---|
| 2000 | 28,792 | 27,722 | 1,070 | 22,720 | 415,529 | 6.67% | 0.26% |
| 2001 | 29,620 | 29,081 | 539 | 23,259 | 422,485 | 6.88% | 0.13% |
| 2002 | 28,903 | 29,095 | -192 | 23,067 | 434,744 | 6.69% | 0.04% |
| 2003 | 31,958 | 29,981 | 1,977 | 25,044 | 446,203 | 6.72% | 0.44% |
| 2004 | 31,525 | 30,588 | 937 | 25,981 | 455,027 | 6.72% | 0.21% |
| 2005 | 32,062 | 31,532 | 530 | 26,511 | 461,917 | 6.83% | 0.11% |
| 2006 | 32,349 | 31,485 | 864 | 27,375 | 468,532 | 6.72% | 0.18% |
| 2007 | 32,852 | 32,817 | 35 | 27,410 | 475,854 | 6.90% | 0.01% |
| 2008 | 33,144 | 33,138 | 6 | 27,416 | 483,875 | 6.85% | 0.00% |
| 2009 | 33,767 | 34,634 | -867 | 26,549 | 492,086 | 7.04% | 0.18% |
| 2010 | 34,001 | 34,662 | -661 | 25,888 | 500,043 | 6.93% | 0.13% |
| 2011 | 34,553 | 36,541 | -1,988 | 23,900 | 507,618 | 7.20% | 0.39% |
| 2012 | 34,744 | 36,664 | -1,920 | 21,980 | 514,941 | 7.12% | 0.37% |
| 2013 | 35,232 | 38,503 | -3,271 | 18,709 | 522,208 | 7.37% | 0.63% |
| 2014 | 35,340 | 38,485 | -3,145 | 15,564 | 529,529 | 7.27% | 0.59% |
| 2015 | 35,806 | 40,508 | -4,702 | 10,862 | 536,905 | 7.54% | 0.88% |

Source: Bundesamt für Sozialversicherungen (2004a), T16 on p.70

### *2.1.2 Contribution Rates in the First Pillar*

The contribution rate is a percentage of all labor income without any lower or upper limit. The current rate is 8.4 percent for employed workers, of which the employer has to pay half. Self-employed workers pay 7.8 percent on what they declare as income. The contributions accumulated during a marriage are split between the partners in case of divorce, or when the first partner reaches retirement.

For parents of children up to 16 years, child care credits are automatically granted on top of the contributions of regular labor income. The credits are equivalent to a labor income of three times the minimum benefits. The same is true upon request for individuals caring for sick or frail relatives.

Non-working individuals, including students, are required to contribute at least 425 Swiss francs a year to insure a full contribution period, unless their spouse contributes at least 850 Swiss francs a year. The contributions of individuals without labor income increase as a fraction of total wealth, which includes savings, assets and real estate, as well as regular benefits (such as unemployment, second pillar income, annuities) multiplied by

20[9] . The minimum amount of 425 CHF applies to total wealth strictly below 300,000 CHF, increasing by 101 CHF for each additional 50,000 CHF until 1,750,000, and by 151.5 CHF for each additional 50,000 CHF. The maximum contribution amounts to 10,100 CHF.

Table 2 offers an overview over the contribution rates and the benefits of the AHV/AVS since its onset in 1948. The benefit structure will be explained below.

**Table 2 AHV: Contribution Rates and Benefits since 1948**

| Coming into force | Single Benefits (current prices (cp)) | | Old-age benefits (cp) average (women & men) | Single Benefits (corrected by NLI[10]) | | Contribution Rates (as % of wage) | |
|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | | Minimum | Maximum | Employees | Self-emp. |
| 1948 | 40 | 125 | | 407 | 1,271 | 4.0% | 4.0% |
| 1951 | 40 | 125 | | 381 | 1,191 | 4.0% | 4.0% |
| 1954 | 60 | 142 | | 540 | 1,279 | 4.0% | 4.0% |
| 1956 | 60 | 142 | | 505 | 1,196 | 4.0% | 4.0% |
| 1957 | 75 | 155 | | 603 | 1,247 | 4.0% | 4.0% |
| 1961 | 90 | 200 | | 611 | 1,358 | 4.0% | 4.0% |
| 1964 | 125 | 267 | | 685 | 1,464 | 4.0% | 4.0% |
| 1967 | 138 | 294 | | 617 | 1,315 | 4.0% | 4.0% |
| 1969 | 200 | 400 | | 805 | 1,609 | 5.2% | 4.6% |
| 1971 | 220 | 440 | | 719 | 1,437 | 5.2% | 4.6% |
| 1973 | 400 | 800 | | 1,051 | 2,102 | 7.8% | 6.8% |
| 1975 | 500 | 1,000 | 735 | 1,089 | 2,179 | 8.4% | 7.3% |
| 1977 | 525 | 1,050 | | 1,094 | 2,188 | 8.4% | 7.3% |
| 1979 | 525 | 1,050 | | 1,026 | 2,053 | 8.4% | 7.8% |
| 1980 | 550 | 1,100 | 845 | 1,020 | 2,041 | 8.4% | 7.8% |
| 1982 | 620 | 1,240 | 966 | 1,012 | 2,023 | 8.4% | 7.8% |
| 1984 | 690 | 1,380 | 1,085 | 1,056 | 2,111 | 8.4% | 7.8% |
| 1986 | 720 | 1,440 | 1,142 | 1,032 | 2,063 | 8.4% | 7.8% |
| 1988 | 750 | 1,500 | 1,201 | 1,014 | 2,028 | 8.4% | 7.8% |
| 1990 | 800 | 1,600 | 1,292 | 985 | 1,969 | 8.4% | 7.8% |
| 1992 | 900 | 1,800 | 1,465 | 988 | 1,976 | 8.4% | 7.8% |
| 1993 | 940 | 1,880 | 1,568 | 1,005 | 2,010 | 8.4% | 7.8% |
| 1995 | 970 | 1,940 | 1,632 | 1,009 | 2,018 | 8.4% | 7.8% |
| 1997 | 995 | 1,990 | 1,670 | 1,018 | 2,036 | 8.4% | 7.8% |
| 1999 | 1,005 | 2,010 | 1,663 | 1,018 | 2,036 | 8.4% | 7.8% |
| 2001 | 1,030 | 2,060 | 1,626 | 1,005 | 2,011 | 8.4% | 7.8% |
| 2003 | 1,055 | 2,110 | 1,673 | 998 | 1,995 | 8.4% | 7.8% |
| 2005 | 1,075 | 2,150 | 1,704 | 1,007 | 2,015 | 8.4% | 7.8% |

Source: Bundesamt für Sozialversicherungen (2005), T4.2 on p.99

### *2.1.3 Benefits in the First Pillar*

The first pillar aims at providing a basic subsistence level of income to all retired residents with a full contribution period of 45 years for men and 44 years for women. Thus, there is no specified target replacement rate. In reality, the average replacement rate with respect to pre-retirement income is approximately 35 percent. It is much higher for low-income individuals with a full contribution period, and very low for high income people.

[9] This second component of the contribution defining total wealth can be seen as an approximation of the present value of additional income.
[10] NLI = Nominal Wage Index, 100 = year 2000.

In the case where the retiree is eligible for a full pension, his insured monthly minimum pension is 1075 CHF (in 2005[11]). The maximum first pillar benefit is equivalent to twice the minimum pension. Although it is difficult to put these numbers in relation to the subsistence needs due to the high variability of living costs in Switzerland, even the maximum benefit level does not exceed the poverty line by much - if at all.

The first pillar (AHV) distinguishes between "full" and "partial" pensions. Every retiree who has worked for at least one year is eligible for pension benefits. He gets a full–pension if he contributed over the entire mandatory period. Pension benefits can be claimed after the legal retirement age (i.e., for women at age 64 and for men at age 65), regardless of whether the agent leaves the workforce or not.

In case of death, the survivor can claim a 20 percent increase in his pension as long as he qualifies for an old-age pension, provided that the existing pension benefit plus the supplement does not exceed the maximal first pillar benefit. If the retired individual has children, (s)he can claim children benefits amounting to a maximum of 40 percent of the base AHV/AVS benefits per child. If both spouses are eligible for children benefits the sum cannot exceed 60 percent of the maximum first pillar pension (per child). A partial pension is paid if the contribution has not covered the whole mandatory period. For each contribution year missing, AHV/AVS benefits are reduced by at least 1/44.

Pensioners can claim supplemental, means-tested benefits to cover their living costs if their combined first and second pillar income is too low. In principle, these supplemental benefits are equivalent to the difference between an individual's or couple's income and the expenditures deemed necessary. The latter include the actual rent (or mortgage payments), so-called "basic needs" (a fixed sum per person) and actual health expenditures. Not all individuals qualifying for supplemental benefits claim them as they are still associated with a certain stigma, especially in rural regions. The take-up rate is approximately 50 percent, but no detailed information exists so far. The combination of a relatively flat benefit structure and supplementary benefits has led to a low poverty rate among the elderly in Switzerland[12], although there are still gaps for low–income earners.

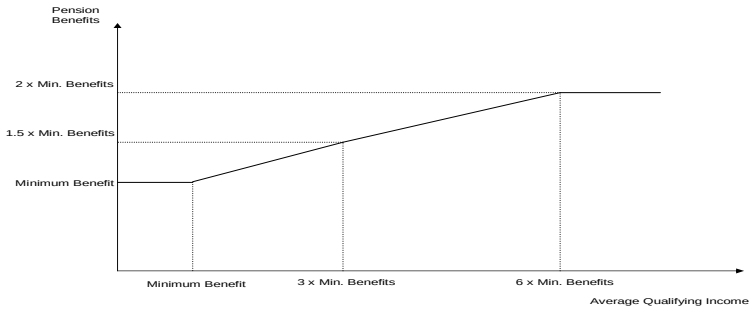
There is a contribution–benefit linkage in Switzerland, but the benefit scheme is relatively flat in reality. The qualifying yearly income is a weighted average of all income on which contributions have been levied. An adjustment factor is applied on earlier contributions to take into account inflation and wage growth. The linkage is depicted in Figure 6: Up to an average qualifying income equal to the minimum benefit, the AHV pension is also equal to this minimum benefit. It increases linearly to 1.5 times the minimum benefit until a qualifying income of 3 times the minimum level. (This latter number is also

[11] The minimum pension is linked to a so called "Pension Index". This index accounts for increasing wages and prices and is computed as the arithmetic mean of the wage- and price-index (cf. Art.33ter Para.2 AHVG; AHVG = Bundesgesetz über die Alters- und Hinterlassenenversicherung). As per 1.1.2005 the "Pension Index" reached 195.5 which yields a minimum pension of 1075 CHF.

[12] The last comprehensive poverty study in Switzerland dates back to 1992 (Leu et al. (1997)). It reports a poverty rate of 5.6 percent for the whole population, and of only 3.6 percent for people beyond the legal retirement age. Recent numbers suggest that the general picture has remained unchanged.

equal to the child care credits that are granted.) After that, the benefit increases again linearly up to the maximum benefit (which is twice the minimum) up to the upper limit of 6 times the minimum (or 3 times the maximum) benefit.

**Figure 6 First Pillar Benefits as a Function of Qualifying Average Income**

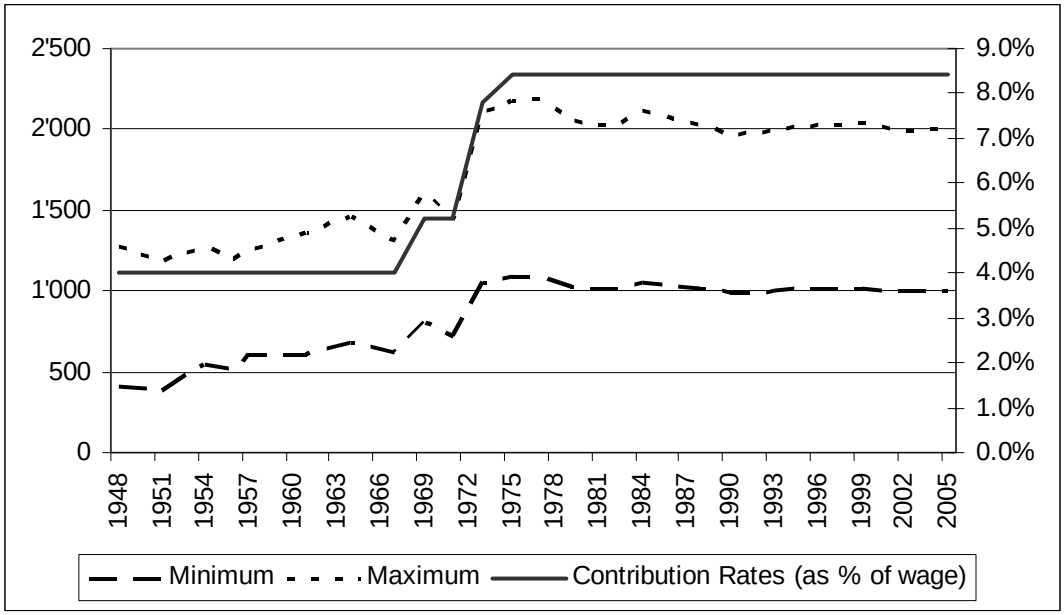



Source: Bundesamt für Sozialversicherungen

As most people earn an average income clearly exceeding the three-times-minimum-benefit threshold, the effective linkage between pre–retirement earnings and the benefit level has become considerably weaker in the last two decades. A large majority of (potential) beneficiaries with a full contribution period are entitled to maximum benefits, so that earnings history only matters for people with low average wages and/or contribution gaps. An average married couple, for example, receives more than 92 percent of the maximum benefits.

Notwithstanding the changes in the structure of the first pillar, the payroll tax rate has remained unchanged at 8.4 percent since 1975, and the ratio between average pension benefits and the average labor income has remained almost constant for more than 30 years. Figure 7 depicts the evolution of the first pillar contributions and the relative benefits since the beginning of the AHV insurance system. The benefits are deflated by the nominal wage growth to depict their relationship to the wage level. Figure 7 as well as Table 3 shows that the implied replacement rate as well as the average replacement rate has stayed approximately constant in the last three decades.

**Figure 7 Deflated Benefits since 1948**




Source: Own illustration

**Table 3 Average Pensions, Income and Replacement Rates**

| Retirees AHV/IV | 1990 | 1998 | 2000 |
|---|---|---|---|
| Total average monthly income households (CHF) | 4,124 | 6,070 | 5,761 |
| Average monthly pension payments (CHF) | 1,737 | 2,301 | 2,313 |
| Average replacement ratio | 42% | 38% | 40% |

Source: Bundesamt für Sozialversicherung (2004a), p.6

The number of contribution years, including those granted for childcare, is essential in the determination of future benefits. Some special rules apply for couples and survivors: Married couples' entitlements are capped at 150 percent of a single benefit. This reduction takes into account that per capita expenses are considerably lower in a two–member than in a single household. It is also a compensation for the survivor insurance granted to married couples during the working period. The redistribution between single and married individuals is relatively small in this pillar.

Since 2002, individuals can also retire one or two full years earlier. The adjustment rate at which benefits are reduced is actuarially fair at 6.8 percent annually for men and women born in or after 1948. For women born between 1942 and 1947, the rate is only 3.4 percent per year to cushion the effect of the recent increase in the female retirement age. The benefits can also be delayed by one to five years at an annual adjustment rate of 5.2 percent.

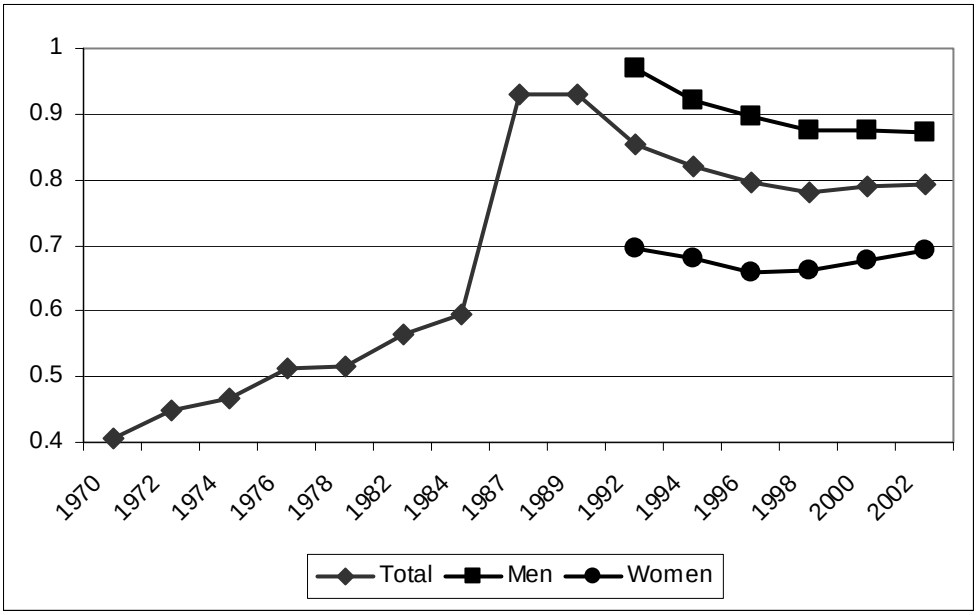
## 2.2 The Second Pillar: Occupational Pension Plans

### *2.2.1 Overview*

The Swiss second pillar, organized as an occupational pension system has known a long history, but became mandatory only in 1985. As Figure 8 shows, a sizeable fraction of the working force had already been covered before such plans were mandated. The figure

overstates the true coverage rate due to double–counting of insured individuals (those working for more than one employer) at the onset of the mandatory regime. The numbers since the mid-1990s are therefore more reliable. They convey a relatively high and stable coverage rate for male workers, as well as a slightly increasing coverage for women.

**Figure 8 Workers Covered by an Occupational Pension Plan since 1970**




Source: Own Calculations

The main goal of the second pillar is to maintain the pre-retirement living standard together with the benefits stemming from the first pillar. The target replacement rate differs between companies, but it is usually in the range of 50-70 percent of pre-retirement labor income (before taxes and social security contributions), including benefits from the first pillar. Most pension funds specify their target replacement rate as a fraction of the insured wage (see below). Apart from retirement income, the second pillar also provides insurance for *disability* and *survivors* of insured workers during the accumulation period (see section 2.5 for additional information).

As already mentioned, employers organize occupational pension plans, by either having an autonomous pension fund or a contract with an insurer. As a consequence of this (and also for historical reasons), the system is highly fragmented. In 2002, there were more than 8,000 funds, but this number has decreased rapidly since then (c.f. Section 5.1). The consolidation process was due to many small firms outsourcing the organization of the second pillar, as well as many joint initiatives of groups of firms.

When occupational pension plans were mandated, almost all schemes were operated as defined-benefit schemes (DB). At that time the accumulated pension capital was not fully portable. However, changes in regulation have mandated the full portability of retirement savings and have caused a conversion of schemes so that now more than 85 percent have become defined contribution schemes (DC).

There is a strong link between the accumulation and decumulation phases of the second pillar. Both are with the same sponsor with almost no exceptions. Although in some plans individuals are allowed to cash out their old-age savings and could, in principle, purchase another annuity contract, virtually nobody does that. Occupational pension plans offer two advantages over market annuity products. Firstly, they are hardly plagued by adverse selection problems. Secondly and far more importantly, the regulated high annuity conversion factor has compensated workers for the lower than market returns that have been obtained over the accumulation phase, at least during the first twenty years of operation of the second pillar. Whether these regulated features of the second pillar are viable in the long run is an open question.

### *2.2.2 Contribution Rates and Capital Accumulation in the Second Pillar*

The second pillar is designed to be integrated together with the first pillar. As the latter already provides a basic level of income, the BVG[13] usually only insures income above a certain threshold level. This so-called coordination offset equals 22,575 CHF in 2005. The lower threshold explains the lower coverage for female workers (Figure 8), who often work part–time and have lower average wages than men. Income above the threshold level is called *coordinated salary*. To compensate for a potential underinsurance of low-income individuals, a lower entry income (19,350 CHF) into the second pillar was introduced in January 2005. For income above the entry threshold (19,350 CHF) and below a yearly income corresponding to the maximum first pillar benefit (25,800 CHF), the minimum coordinated salary is 3,225 CHF.

There is also a maximum level of insured earnings equal to 77,400 CHF. Pension providers are free to offer insurance for income below or above of these two threshold levels. While most do for income greater than the maximum — many companies do not even have an upper level — very few do for income below the threshold level. Contributions paid on the income between the two thresholds are called mandatory, all contributions above the upper threshold are part of the super-mandatory insurance.

Contributions to the mandatory part (and in most cases also to the super-mandatory part) are a certain percentage of the coordinated (= insured) salary. By law the employer has to pay at least half, but many pay more, thus the average fraction paid by the employer is approximately 60 percent. The law also mandates minimum contribution rates (as a total for employer and employee). They range from 7 percent at an age of 25 to 18 percent from the age of 55 onwards, as shown in Table 4. But as long as average contribution rates are in line with the rates mentioned above, pension funds are free to deviate from the specified pattern. Many providers use uniform contribution rates for all ages, thus compensating lower rates for older workers by higher rates for younger workers.

[13] BVG = Bundesgesetz über die berufliche Alters-, Hinterlassenen- und Invalidenvorsorge

**Table 4 Total Minimal Contribution Rates under BVG law**

| Age | Contribution Rates |
|---|---|
| 25-34 | 7% |
| 35-44 | 10% |
| 45-54 | 15% |
| 55-65 | 18% |

Source: Bundesamt für Sozialversicherungen

Contributions, which are also called age retirement credits, are accumulated as retirement assets and bear an interest rate. The Swiss Federal Council determines the minimum rate of return. It remained at 4 percent for 17 years (from 1985 to the end of 2002). But due to the decrease in capital market returns, this rate has been reassessed so that now for the year 2005 it equals 2.5 percent. This minimum interest rate paid on the old-age insurance balances is one special feature of the Swiss system. Furthermore, it constitutes part of the regulation framework of the second pillar and is therefore discussed more in detail in section 3.2.

The accrued capital is fully portable (with minor deductions especially for short employment spells) when the insured individual changes employer. By law, an employee changing firms gets the accumulated total contributions accrued at the minimum interest rate. The law is silent as to how accumulated reserves have to be distributed. In practice this implied that job changers got less than their fair share during the high return periods. This feature was considered an important obstacle to mobility in the Swiss labor market in the 1990s.

In addition to the contributions to the old–age credit balances, further contributions are needed to cover supplementary insurance or other services. These additional charges include:

- The mandatory insurance for the risks of *death* and *disability*. In the case of death the surviving spouse is eligible to an annuity of 60 percent of the level that the deceased worker would have received at retirement, orphans can claim a pension of 20 percent of this amount. In the case of disability, the insured is eligible for a disability pension. To calculate these benefits, the same conversion factor as for the calculation of the normal old–age provisions is used, but obviously based on a projected old–age credit balance at the age of 65. There are no restrictions on the contributions for these additional risks (disability and death). On average, these costs amount to 3 percent of the insured wage[14].
- Special measures[15]: Since 1985, the mandatory premia for special measures have amounted to 1 percent of the total insured wage bill of all insured individuals in a pension fund. In the past these premia were used partly to finance the contributions of individuals without a second pillar prior to the BVG. The second use was the accumulation of reserves in order to adjust benefits to inflation or to reduce future risk premium. The first use is no longer relevant. Also, in practice the second use does not seem the most appropriate way of covering inflation. The federal council

[14]Source: www.vorsorgeforum.ch
[15]In German: Sondermassnahmen

presently discusses the abolition of this type of contribution.

- Guarantee Fund: The contributions amount to 0.1 percent of the covered wages.

For all these additional contributions, the employer has to pay at least half as well.

### *2.2.3 Benefits in the Second Pillar: Overview*

Upon retirement, the accumulated capital can be withdrawn either as a monthly life–long annuity or as a lump sum:

Annuity:

This is always a life–long income stream computed from the fraction of accumulated pension capital that is not withdrawn as a lump-sum (see below). There are no other forms of annuitization such as phased withdrawals or annuity certain.

Capital payment:

Depending on the pension fund, a fraction of the capital can be withdrawn as a lump-sum. Until 2004, pension funds were not required to allow this capital option. From 2005, pension funds are required to allow retirees to withdraw at least 25 percent of the old-age capital (in the mandatory part) as a lump sum. Many pension funds allow much higher lump sum withdrawals. To mitigate adverse selection effects due to short run deterioration of an individual's health status, pension funds can require the capital option to be requested up to 3 years prior to retirement (see also below). Before 2005 pension funds could voluntarily allow lump sum withdrawals. In fact, lump sum withdrawals have been rising over time, mainly due to more plans allowing the capital option but they still represent a small proportion of accumulated balances.

### *2.2.4 Annuities in the Second Pillar*

Old age pension benefits are strictly proportional to the accumulated retirement assets (retirement credits plus accrued interest). The accumulated capital $K$ is translated into a yearly pension $B$ using the conversion factor $\gamma$:

$$B = \gamma\ K$$

The legal annuity conversion factor applies to the mandatory part of the second pillar. As already mentioned, the annuity conversion factor had been fixed at 7.2 percent until the end of 2004 for all retirees retiring at the statutory age regardless of marital status or gender (see below). This number was constructed using a discount rate of 4 percent (corresponding to the underlying technical interest rate, not to the legal minimum interest) and (period) mortality tables that were approximately correct for men at that time, but not for women (mainly due to a lower statutory retirement age). As a reaction to the increase in longevity and to the fact that the credit balances have to be prorated over a longer horizon, the conversion rate will successively be reduced to 6.8 percent in 2014 as shown in Table 5. The current temporary wedge between the rate for men and the rate for women is due to a political compromise, by which a slower decrease in the conversion factor should

compensate women for the increase in the retirement age. In November 2005, the federal council announced, that the conversion factor will be gradually further reduced to 6.4 percent over the next ten years. This initiative has not yet been confirmed by parliament.

Pension funds are free to apply any other conversion rate to the super-mandatory part of the retirement savings. Nonetheless, very few companies have used this option until a few years ago. This has been changing recently due to financial constraints. The large insurance companies providing insurance predominantly for many small and medium companies have recently reduced the conversion factor for non-mandatory retirement capital in quite a dramatic way to 5.4 percent - 5.8 percent. The fact that virtually all companies came up with an identical number for the reduced male conversion factor to the third digit after the decimal point (= 5.835) caused a considerable protest. Although insurance companies use identical mortality tables, this coincidence does not really suggest a high degree of competition among the insurance providers.

It is important to mention that a pension fund can apply a lower rate than the legal conversion factor under certain conditions. For this purpose it has to use the resources freed up as a consequence of a lower conversion rate to improve the benefits for the covered individuals. The law does not put restrictions on how these means should be distributed. In practice, many pension funds make use of this possibility, though no data exist on the importance of this alternative measure. Most of the funds finance early retirement programs and inflation indexing. A deviation from the (too high) legal conversion factor has several advantages. It allows the fund to tailor the benefits to the needs of the beneficiaries, and gives more flexibility and financial leeway to the fund. However, there is also a risk if the supplemental benefits are distributed unequally among different subgroups of the potential beneficiaries.

**Table 5 Legal Conversion Factors for Women and Men (mandatory part)**

| Year | Birth Y. Women | RA Women | Women BVG | Men BVG | Women (lowest) | Men (lowest) |
|---|---|---|---|---|---|---|
| 2000 | 1938 | 62 | 7.20% | 7.20% | | |
| 2001 | 1939 | 62 | 7.20% | 7.20% | | |
| 2002 | 1940 | 62 | 7.20% | 7.20% | | |
| 2003 | 1941 | 62 | 7.20% | 7.20% | | |
| 2004 | 1942 | 62 | 7.20% | 7.20% | 5.454% (62) | 5.835% |
| 2005 | | (64) | (7.20%) | 7.15% | 5.454% (62) | 5.835% |
| | | | | 7.15% | 5.718% (64) | 5.835% |
| 2006 | 1943 | 63 (64) | 7.15% | 7.10% | | |
| 2007 | 1943 | 64 | 7.20% | 7.10% | | |
| 2008 | 1944 | 64 | 7.10% | 7.05% | | |
| 2009 | 1945 | 64 | 7.00% | 7.05% | | |
| 2010 | 1946 | 64 | 6.95% | 7.00% | | |
| 2011 | 1947 | 64 | 6.90% | 6.95% | | |
| 2012 | 1948 | 64 | 6.85% | 6.90% | | |
| 2013 | 1949 | 64 | 6.80% | 6.85% | | |
| 2014 | 1950 | 64 | 6.80% | 6.80% | | |

The last two columns give the lowest quoted rates for capital exceeding the mandatory level. Retirement ages (RA) are for women (RA men = 65), the numbers in parenthesis correspond to the legal, but not effective RA (women turning 64 in the years 2005 and 2006 would have retired before).

Source: www.bsv.admin.ch and own research

Inflation indexation:

In principle, benefits are *fixed nominal annuities,* but the law states that pension providers have to adjust current old age benefits to inflation within the scope of their financial possibilities. Due to the financial strain on most funds, current benefits are typically not fully indexed to inflation anymore. This is different from the 1980s and 1990s when benefits were not only indexed to inflation, but sometimes even to the growth rate of wages. These more generous benefits could be financed because the minimum interest rate that had to be granted on old-age credits was considerably below market returns. Given the current low inflation situation, the non-indexation of benefits to inflation does not affect very much retired individuals.

Single life and joint annuities:

The BVG/LPP mandates joint annuities; the conversion factor is the same for everybody irrespective of gender, family status or income. Children under age 18 (or under age 25 if still dependent) of retired persons get an additional pension of 20 percent of the main claimant's benefit. When a retired individual dies, his widow (her widower) receives a benefit amounting to 60 percent of the previous pension, his/her dependent children a benefit of 20 percent each. Until 2005, surviving husbands of deceased female retirees did not get a widower's pension. The recent change of this law was not disputed mainly due to its low cost.

The uniform conversion factor (at least in the mandatory part) generates sizeable redistribution especially between married and non-married men as will be outlined in the section computing MWRs. The difference between women and men is relatively small due to the fact that the higher life expectancy of women is almost compensated by the much lower present value of survivor benefits.

### *2.2.5 The Capital Option*

As of 2005, pension funds must allow a withdrawal of at least 25 percent of the accumulated capital as a lump sum. There are no legal restrictions on how much can be cashed out. The decision regarding what fraction of the capital has to be annuitized is left to the individual pension fund.

Even before this change to the law, many private pension companies in Switzerland had offered a choice between a lump-sum capital payment upon retirement or a life-long annuity. The expected return of each of these two options for an individual depends crucially on his/her expected life-time, his/her marital status, and on the presence of children under 18 years old.

The option to withdraw a fraction (or all) of the accumulated capital as a lump sum entails in general two potential problems for the pension scheme:

1. The possibility that individuals withdrawing their capital as a lump sum end up having too little resources to live on in old age, once the capital has been depleted.

As individuals can claim means-tested additional benefits from the AHV/AVS in case of insufficient retirement income, the capital option constitutes a risk for the first pillar.

2. The problem of adverse selection if individuals with a low expected return from an annuity are more likely to withdraw their old-age capital as a lump sum, leaving the funds with the annuity obligations of the long-lived. The adverse selection problem affects the pension funds directly.

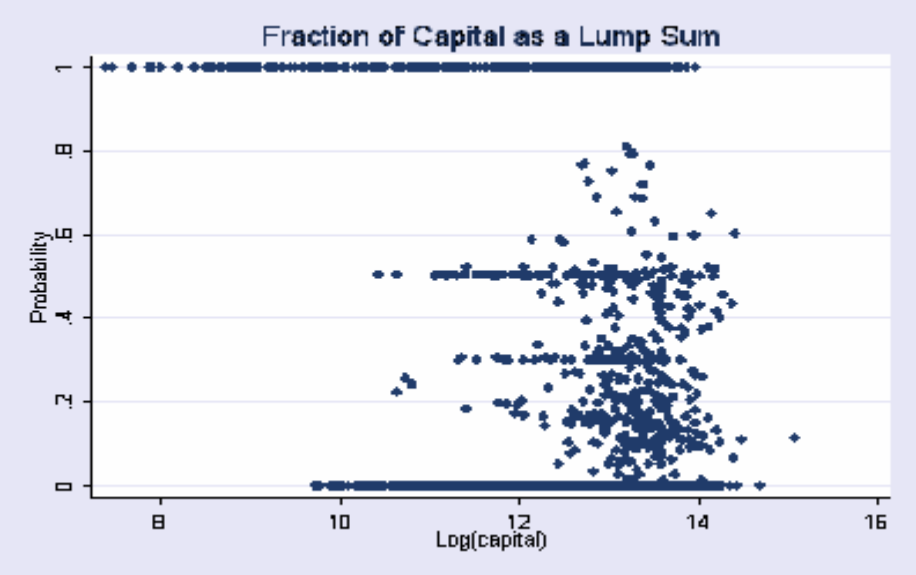
There are no conditions on the level of the remaining annuity benefits (including survivor benefits) when the capital is withdrawn as a lump-sum. The pension funds do not seem to put any restrictions in general, which is not surprising given the fact that the shortfall risk lies with the public pension scheme and not with the occupational pension provider. For withdrawals within the 25 percent limit as specified by the law, there is little concern to allow the lump-sum option. However, many pension funds, in particular those of small companies allow the entire capital to be withdrawn upon retirement. In these cases, there is a considerable risk to deplete the available resources too quickly, which constitutes an even greater risk for surviving spouses. While there are no representative studies that estimate the fraction of people choosing the lump sum, it is not uncommon that a large fraction of retirees in some companies withdraw the whole pension capital upon retirement. Our own data, as well as preliminary results from the pension fund statistics, suggest that approximately 20 percent of retirees choose the lump sum, with huge differences across pension funds[16].

In reality, the second potential problem, the adverse selection, does not seem to represent a threat to the pension funds. This is pretty surprising given the fact that there are sizeable differences in MWRs across different subgroups of the population. For example, one would expect single men to opt for the lump sum much more often than married men due to a lower expected annuity return caused by higher than average mortality rates and the absence of survivor benefits. In the data, this does not seem to be the case, as is reported in Bütler & Teppa (2005). The most striking outcome is that single men are as likely to choose the annuity as married men, although in many cases they get a worse deal from an annuity compared to married men. One can only speculate as to why this is the case. The absence of family ties may be a factor. Single men may attach greater value to the longevity insurance provided by the annuity; in contrast, married men may place greater value to the bequest motive and thus opt for partial lump sums to a greater extent than single men. The fact that annuities from the mandatory pillar are offered at highly advantageous terms may explain the relatively limited use of lump sums by all participants. For women the picture is a bit different (but adverse selection effects are also much smaller due to the smaller differences in survival rates between different marital status). Married women are more likely to opt for the capital option, presumably because they are the second earner in the family and they already benefit from a high degree of annuitization stemming from the primary earner.

[16] When collecting the data for the paper "The Choice Between an Annuity and a Lump Sum" (Bütler & Teppa, 2005) a number of pension funds had to be excluded for the lack of sufficient variability with respect to the capital option. A number of pension fund managers reported that virtually all retirees would choose the lump sum, others that the capital option was very uncommon.

The fraction of capital cashed out at retirement as a function of the accumulated old-age capital, taken from the Bütler & Teppa (2005) sample, is depicted Figure 9. There are several interesting features to be observed: Firstly, small capital balances are much more likely to be withdrawn as a lump sum. This small-balance effect can be interpreted as a consequence of differential mortality, magnitude effects[17] and additional income support[18]. Secondly, for very high capital levels, the fraction cashed out is slightly increasing, reflecting bequest motives[19], investment opportunities[20], and a preferential tax treatment[21]. The increase for higher capital balances, however, is not statistically significant, in contrast to the statistically highly significant small capital balance effect. Thirdly, the majority of retirees opting for the lump sum withdraw the highest possible amount (often 100 percent, in some cases 25, 30 or 50 percent).

**Figure 9 Fraction of Capital Cashed out as a Lump-Sum**




Source: Bütler and Teppa (2005).

[17] For small stakes agents generally prefer an early payment to a deferred one even if this choice implies a high discount rate.
[18] An annuity, even small, may be detrimental to the eligibility for income support.
[19] The higher the annuity, the lower the marginal utility of consumption at the given level. People might prefer to hold their pension wealth in the form of capital to be able to bequeath it to their children (at least partially). Of course, agents can save for a bequest independently from the accumulated capital at retirement, but there is the risk to die prematurely and thus leave a small amount of money. The lump sum payment guarantees a certain level of bequest.
[20] An individual may choose the capital option if he thinks he can obtain a better return than the one offered from the annuity scheme. Investment opportunities will most likely depend on the total amount to be invested, but also on investment abilities. The higher average capital stock at retirement may facilitate alternative investments especially if investment abilities are correlated with wealth.
[21] In Switzerland, there is clearly a tax advantage to withdraw the accumulated pension wealth in the form of a lump sum. This effect is much stronger for high and very high levels of capital.

### *2.2.6 Administration Costs*

Administration costs are low by international standards, but still high compared to those of the AHV. Table 6 presents the evolution of administration costs since 1970. Current administration costs amount to approximately 5 percent of total contributions or 6 percent of total benefits. It seems as if the mandatory BVG system increased the cost efficiency of pension providers. However, one has to keep in mind that the measurement of administration costs is notoriously difficult, since it is not straightforward whether to assign the costs to the fund or the employer. Especially for small employers, the operation of the pension fund offers quite some synergy gains, as the administration of the first and second pillar can be done in tandem.

In addition to the pure administrative costs, there are also the asset management costs. Over the period explored in Table 6 the relative costs have remained constant at around 0.3 percent. As a comparison, the total administrative costs of the first pillar (i.e., operating costs, pure administrative costs, and the costs of the asset management together) amount to 0.3 percent of the total contributions.

**Table 6 Administrative costs of the Second Pillar**

| BVG<br>In m. CHF | 1970 | 1987 | 1990 | 1996 | 1998 | 2000 | 2002 |
|---|---|---|---|---|---|---|---|
| Total Contributions[22] | 3458 | 15,125 | 20,860 | 24,709 | 26,415 | 25,842 | 28,394 |
| Total Benefits[23] | 1,317 | 6,450 | 8,737 | 15,350 | 17,443 | 20,236 | 21,698 |
| Total Assets | n.a. | 165,070 | n.a. | 348,295 | 428,251 | 490,883 | 440,555 |
| Costs asset management (AM) | n.a. | 765 | 913 | 1,311 | 1,335 | 1,318 | 1,388 |
| Pure administrative costs | 264 | 339 | 452 | 751 | 963 | 1,065 | 1,412 |
| Total administrative costs | n.a. | 1,104 | 1,365 | 2,062 | 2,298 | 2,383 | 2,800 |
| In %:<br>Pure admin. cost to: | | | | | | | |
| - total contributions | 7.63% | 2.24% | 2.17% | 3.04% | 3.65% | 4.12% | 4.97% |
| - total benefits | 20.05% | 5.26% | 5.17% | 4.89% | 5.52% | 5.26% | 6.51% |
| Cost of AM to: | | | | | | | |
| - total assets | n.a. | 0.46% | n.a. | 0.38% | 0.31% | 0.27% | 0.32% |

Source: Bundesamt für Sozialversicherung (2004b), BV1.1. sqq. on p.125 sqq.

## 2.3 Combined Replacement Rates

As mentioned above, there are no target replacement rates for the first pillar. The idea of introducing an occupational system was to ensure a replacement rate of approximately 60 percent relative to the pre-retirement income for lower and middle income people. The minimum contribution rates in the second pillar are in line with this goal.

[22](employer & employee)
[23](Annuity & Capital)

Most pension funds aim at a replacement rate of approximately 50 percent to 60 percent of the coordinated (insured) income. Very few specify an upper bound on this insured income. Together with the income from the first pillar and the fact that there are no social security deductions on pension benefits, the net replacement rate *before* taxes amounts to 70-80 percent for workers with an uninterrupted working history even for high income groups as shown in Table 7 and Figure 10. Due to the fact that federal and cantonal taxes in Switzerland are progressive, and also as a consequence of the availability of additional children pension benefits, the effective net replacement rate can be well above 100 percent as illustrated in Table 7.

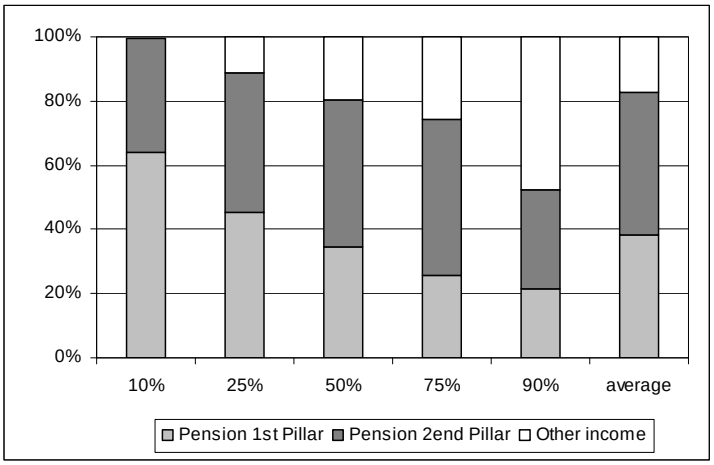
**Table 7 Pension Benefits as a Function of Pre-retirement Income**

| Before retirement | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Gross income | | 50 | | | 100 | | | 200 | |
| Marital status | Sing | marr | m+2 | sing | marr | M+2 | sing | marr | m+2 |
| Net income | 41 | 42 | 44 | 73 | 77 | 80 | 135 | 143 | 147 |
| After retirement | | | | | | | | | |
| I = First pillar | 20 | 30 | 36 | 25 | 38 | 46 | 25 | 38 | 46 |
| II = Second pillar | 12 | 12 | 17 | 37 | 37 | 52 | 87 | 87 | 122 |
| Net (I + II - tax) | 30 | 40 | 52 | 55 | 68 | 89 | 92 | 106 | 139 |
| Replacement rates | | | | | | | | | |
| Gross | 0.65 | 0.85 | 1.07 | 0.63 | 0.75 | 0.98 | 0.56 | 0.63 | 0.84 |
| Net | 0.75 | 0.95 | 1.18 | 0.75 | 0.88 | 1.11 | 0.71 | 0.78 | 0.98 |

(in 1000 Swiss Francs) and marital status (sing = single, marr = married with adult children, m+2 = married with two children under 18/25). The computations are based on the following (very realistic) assumptions: The spouse does not have any second pillar income, but qualifies for the same first pillar pension as the main bread winner (mainly through child care credits and part-time income) in the married adult with children case. For the married with two minor children case, it is assumed that the spouse (for obvious reasons the wife) is too young to claim her own benefits. The pension fund replaces 50 percent of coordinated income (= income - 25,300) with no upper income limit. Children benefits are 40 percent (first pillar) and 20 percent (second pillar) of the main claimant's benefits each. The tax base is the city of Zürich.

Source: Authors' calculations

**Figure 10 Replacement Ratios as a Function of Income: 1st and 2nd Pillar**



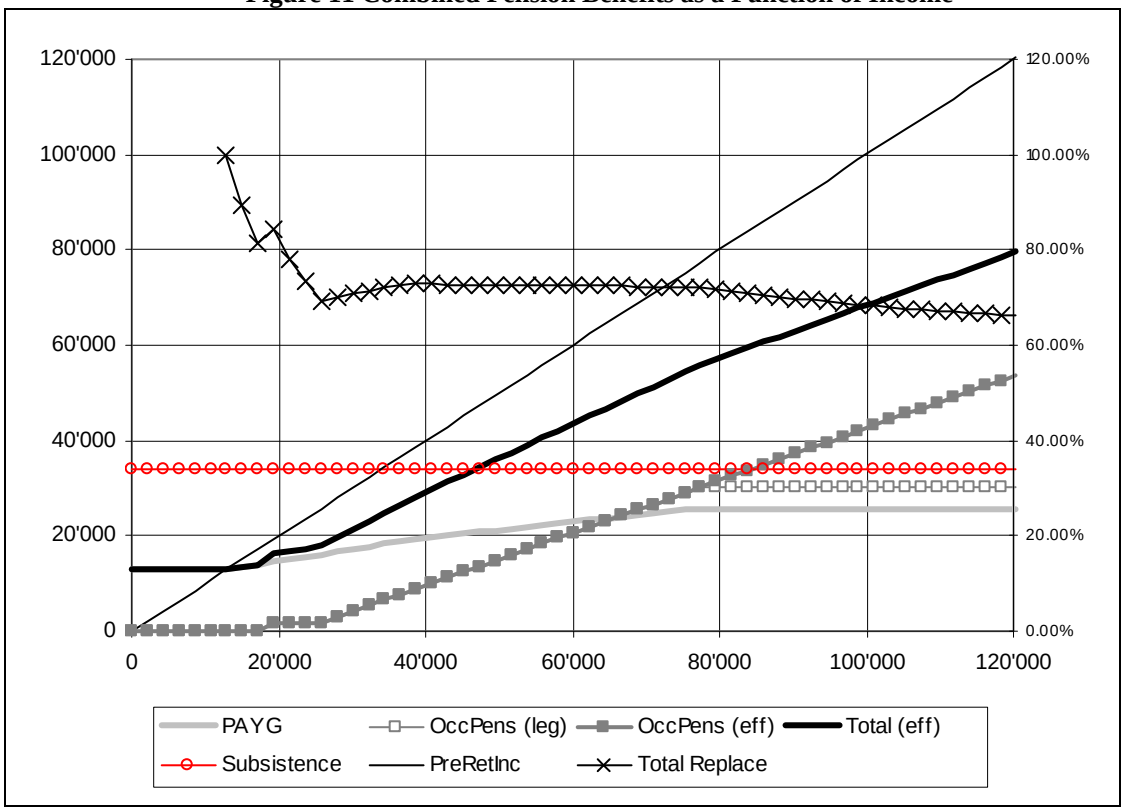

Note: Only individuals aged between 65 years and 70 years in 2002 are considered. The average monthly incomes per percentile are 2,947; 5,155; 7,521; 9,962; 13,263 with an overall average of 5,765 CHF.

Source: Einkommens- und Verbrauchserhebung (EVE) 2002

The effective replacement rates can be lower due to interruptions of the work career, low income spells and unemployment. Nevertheless, an uninterrupted working history is still the rule in Switzerland (thanks to a low unemployment rate), notably for high income male individuals.

Figure 11 summarizes the different pension benefits as a function of yearly pre-retirement income for a typical individual with an uninterrupted career. The assumed second pillar replacement rate of 55 percent of *coordinated income* corresponds approximately to the average rate in occupational pension schemes. The schedule for the first pillar benefits (PAYG) is the same as the one depicted in Figure 6 (c.f. Chapter 2.1.3.). These first-pillar benefits are bounded between 12,900 and 25,800 CHF, which corresponds to a yearly average pre-retirement income of 12,900 and 77,400 CHF, respectively. The latter number also constitutes the maximum level of insured earnings within the *mandatory part* of the second pillar *(OccPens (leg))*. As mentioned before, most pension providers insure income above the upper threshold level *(OccPens (eff))*. For yearly pre-retirement incomes of more than 47,000, the sum of first and second pillar pension benefits exceeds the subsistence level of 34,000 CHF, which is guaranteed by means-tested supplemental benefits. Note that the median income of full time workers was 74,200 CHF in 2005. In line with Table 7 and Figure 10, the replacement rates before taxes are around 70 percent *(Total Replace)*.

**Figure 11 Combined Pension Benefits as a Function of Income**




Source: Authors' calculations

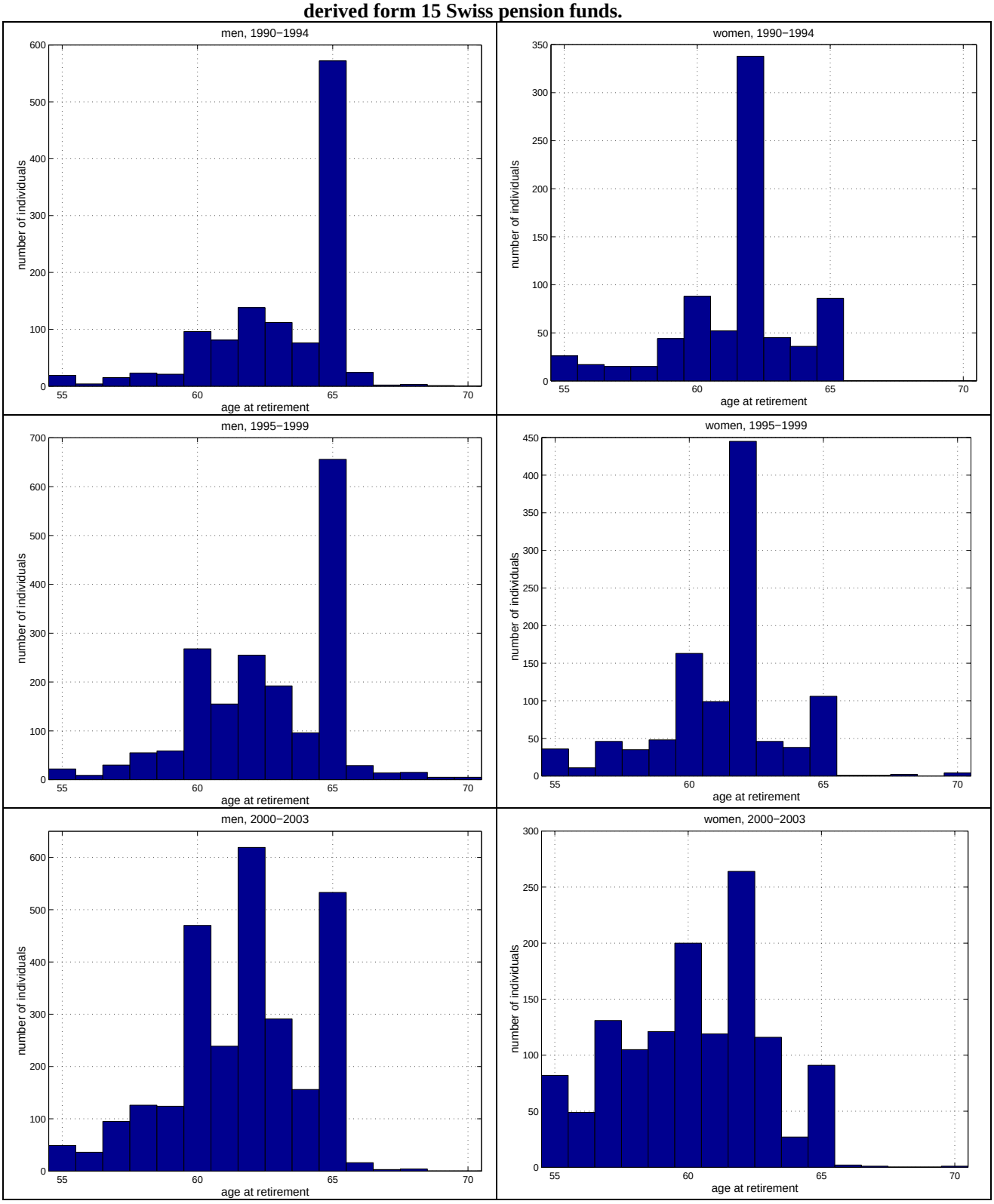
## 2.4 Early Retirement

Early retirement options are now offered by most companies. For many companies this is simply an actuarially fair reduction of the conversion factor in the case of early withdrawals. Some companies offer more generous early retirement packages, including additional payments to make up for first pillar benefits up to the legal retirement age (refer to the appendix for illustrative examples). There are no legal restrictions on how the conversion factor has to be adjusted in case of early retirement. As it has been mentioned before, pension funds are allowed to deviate from the legal conversion factor, if they use the resources to finance other benefits for pensioners, including early retirement options.

Take-up rates for early second pillar benefits are very high. On average, the observed retirement in occupational plans is substantially below the statutory age even in funds that do not subsidize early retirement explicitly. On the other hand, take-up rates of early benefits in the first pillar have been low. Presumably this is due to the fact, that many second pillar pension plans allow an anticipation of benefits at actuarially fair rates (or better). This latter option is administratively more convenient for most beneficiaries.

In the past many beneficiaries (predominantly middle and high income) have received generous early retirement packages from their occupational pension provider, often with additional benefits until age 65/62 (64) to bridge the time to the legal retirement age. Figure 12 displays the distribution of retirement ages collected from 15 Swiss occupational pension funds. One clearly sees that over time the relative importance of the statutory retirement age has declined. For the period from 2000-2003 a triple–peak profile for men at ages 60, 62 and 65 and a double–peak profile for women at ages 60 and 62 is apparent. The peaks at 60 and 62 correspond to the lowest age for which early retirement packages are offered at relatively favorable conditions in occupational pension funds.

**Figure 12 Distributions of age at retirement for men (left-hand side) and for women (right-hand side) derived form 15 Swiss pension funds.**




Source: Bütler, Huguenin and Teppa (2005)

These figures confirm the results found in a recent SAKE/ESPA study[24]. According to this survey, 53 percent of Swiss men and 44 percent of Swiss women retire before the legal retirement age of 65 for men or 62 (since 2005: 64) for women.

Unfortunately, due to the high number of pension funds and the lack of publicly available data on early retirement schemes and take-up rates, there are no representative studies to analyze the issue of early retirement in the second pillar. Consequently, one does not know how the early retirement option performs in terms of MWRs compared to the regular retirement age in general. Moreover, the fraction of funds offering more generous than actuarially fair early retirement options has considerably decreased in the last two years due to the financial constraints faced by most of them.

Bütler, Huguenin and Teppa (2005) try to shed some light on the determinants of the retirement decision other than the impact of social security incentives by analyzing individual data from a non-representative selection of Swiss pension funds. The unique data set of individual retirement decisions used was provided by a number of privately run pension funds, allowing control of all company specific pension plan details.

Note that due to the fact that the second pillar has been mandatory in Switzerland since 1985 (and had been offered by a majority of companies even before that year), differences in accumulated capital at retirement within the same cohort closely mirror differences in lifetime income. Moreover, due to the maturing of the second pillar the average pension capital, and thus the effective replacement rate, has been steadily increasing over the years and now reaches high replacement rates for all income groups. Unlike in other countries, the structure of the second pillar leads to replacement rates that are similar for lower to upper middle class incomes.

Bütler, Huguenin and Teppa (2005) find that the incidence of early retirement has increased considerably over the last decade despite the fact that there were no institutional changes throughout that period. The increase in early retirement is more pronounced for men than for women, and was found to be especially strong in the last few years. It is relatively robust, but differs considerably across pension funds. Due to an increase in the effective replacement rate within Switzerland's second pillar, more people are now able to accumulate sufficient funds to pay for an early labor market exit than one or two decades ago. But even if one controls for this apparent time trend, wealthier men tend to leave the work force earlier. Low-income workers, on the other hand, often work up to the legal retirement age, even in pension funds in which early retirement packages are generous. In these cases the need to generate income seems to be the only explanation for working until the statutory retirement year. For women, the effect of income on the likelihood of exiting the labor force is also positive, but weaker than for men. Due to differences in mortality rates across income groups, richer individuals thus tend to enjoy a much longer retirement spell than poorer people.

[24]SAKE / ESPA is a longitudinal (rolling panel) study of the Swiss labor market, but also covers individuals beyond the retirement age.

## 2.5 Disability

Both pillars also include mandatory disability insurance. In the first pillar AHV, old–age and disability insurance count together as one single social security system and are considered as the governmental provision of social security. The contribution is collected in the form of a 1.4 percent payroll tax, which is again split between the employer and the employee. The federal government covers 50 percent of the cost of first pillar disability pensions. The insurance covers disabilities afflicted since birth, or caused by illness and accident. Entitled to get disability benefits are individuals who are unable to work to at least 60 percent of full capacity. The pension claim depends on the degree of disability. As for the first pillar, disability benefits of the occupational pension system can be claimed by individuals, who are at least 40 percent disabled.

There is also a mandatory accident insurance for employees (paid partly by the employer). This service is provided either by the SUVA[25] or any other insurance company. Furthermore, each person living in Switzerland needs to have mandatory health insurance[26]. The coordination of all the different insurance types is explained in Box 1.

[25]SUVA = Schweizerische Unfallversicherungsanstalt, in english: Swiss Accident Insurance Fund

[26]cf. Art.1ff KVG; KVG = Bundesgesetz über die Krankenversicherung. This law acts subsidiary to the accident insurance mentioned above, i.e., it takes place completely outside the scope of the occupational coverage.

Box 1: Coordination of Different Entitlements to Disability Benefits

First a note on the accident insurance:
The law requires that all employed workers must be covered by compulsory accident insurance, whereas self-employed agents can be insured on a voluntary basis. Insurance payments cover claims caused by industrial accidents, vocational diseases and non-occupational accidents. The premia for the first two claims are borne by the employer, the premia for the latter case have to be paid generally by the employee.

- Therapy: Therapy is provided exclusively by a single social insurance. In compliance with the particular requirements of each institution, charges are at the expense of the institutions stated below (in descending order).
    1. Military Insurance
    2. Accident Insurance
    3. Disability Insurance (first pillar)
    4. Health Insurance

- In--Kind Transfers: In--kind transfers are granted at the expense of the following institutions:
    1. Military Insurance or Accident Insurance
    2. Disability Insurance (first pillar)
    3. Health Insurance

- Annuity Payments: Annuity payments of different social insurances that are intended to compensate for permanent incapacitation, can be accumulated as long as no overcompensation[27] occurs. Hence, it is possible that a disabled person gets a pension from the first pillar, one from the accident insurance and finally one from the second pillar. Still, the order of institutions to be followed is:
    1. Disability Insurance (first pillar)
    2. Military Insurance or Accident Insurance
    3. Disability Insurance (second pillar)

If a person involved in an accident is not employed, health insurance covers the cost. If this person is employed, the accident insurance is the first contact point (provided that the person is not doing his/her military service at that time, otherwise the cost would be covered by the military insurance). The ultimate goal of accident insurance is the reintegration of the disabled into the workforce. Thus, it covers directly the expenditures for therapy or in-kind transfers. Only if a person is permanently disabled and cannot be reemployed in any other job, (s)he is eligible for annuity payments. In such a case, the accident insurance contacts the disability insurance and they both contribute (always assuming that the particular conditions for the different insurances are fulfilled). If these payments are less then 90 percent of the hypothetical earned income without the accident, the disability insurance pays as a third source.

[27] For the definition of overcompensation refer to Art.~69 ATSG

# III. REGULATION

The focus of this chapter is a more detailed description and analysis of regulatory issues within the Swiss occupational pension pillar. The Swiss second pillar is regulated in both the accumulation and decumulation phases. Minimum interest rate requirements (section 3.2), contribution rates and the structure of survivor benefits (as outlined in chapter II) specify the conditions for the annuitant. The Occupational Pension Law (BVG/LPP) and its amendments also put limits on possible asset structures (see section 3.3) and specify capital requirements for the pension funds (section 3.4). New standards of transparency in the realm of the occupational old–age provision are imposed (section 3.5). Other regulatory aspects concern the organization, administration and supervision of pension funds (section 3.6).

Although the minimum requirements are very strict at first sight, there is considerable room for maneuvering, as some rules may be relaxed under certain conditions. This is particularly true for the annuity conversion factor and the minimum interest rate in autonomous pension funds. Funding regulations have also been very imprecise until very recently, and have only required a certified pension expert to attest that a pension fund is able to meet its obligations. The funding regulations have become more precise since 2005, but the rules are still somewhat discretionary and the issue not as transparent as one might wish.

All the requirements mentioned in this section constitute the regulation package to protect the insured workers and pensioners. The regulation measures can broadly be classified as specifying output and input rules. Output conditions specify the result of prudent provision and management. They should be able to be met under prevailing market conditions. Examples are the minimum interest rate rule, capital requirements and conversion factors. On the other hand, input rules directly regulate the instruments with which the schemes should reach certain outcomes. Examples are the specification of contribution rates and the regulation of possible investments. The drawback of this latter approach is that the required supervision is time-consuming and that the regulation may act too much as a straightjacket.

## 3.1 Important Facts on Interest Rates and the Annuity Conversion Factor

In Switzerland, the minimum interest rate on the accumulated pension capital is regulated, but the (technical) rate at which future liabilities have to be computed is not. This fact often generates some confusion, notably as the minimum interest rate was equal to the customarily used technical interest rate for almost two decades. The technical interest rate is also used by the regulatory authorities to assess the annuity conversion factor, albeit in a discretionary fashion. There is thus *no* automatic link between the technical discount rate and the conversion factor.

Let us recall the definition and function of the two different interest rates and the conversion factor.

Minimum Interest Rate:

This rate specifies the minimum rate of return that has to be credited by law on the accumulated pension capital during the *accumulation period*. It can be changed by the Swiss Federal Council. The rate had been constant for a very long time[28], but it is now generally agreed that it should mirror market conditions in the *short and medium run*. The minimum interest rate is thus not used to compute the liabilities of a pension fund. More information on this important regulatory issue is to be found below.

Technical Discount Rate:

The technical interest rate is used to compute the assets and liabilities of a pension fund. It should represent an average rate of return that can be expected to be achieved in a longer horizon of 10 to 20 years. In the long run, the average minimum interest rate and the technical interest rate should align, although they may deviate from each other in the short run. The technical interest rate also plays a crucial role in the determination of the conversion factor together with the mortality tables.

Unlike the minimum interest rate, the technical discount rate is not regulated by the law! The Federal Authorities as well as most pension funds had used 4 percent during the 1980s and 1990s. Most pension funds now use lower rates of 3 to 3.5 percent. There is extensive political discussion concerning the correct rate. Up to now, however, the choice of the technical interest rate has been left to the discretion of the pension funds.

Annuity Conversion Factor:

As outlined in the previous chapter and below, this is the rate at which the accumulated pension capital is translated into a lifelong annuity. It is directly specified by the law, and is not linked to either the minimum interest rate or the discount rate.

### *3.1.1 The Annuity Conversion Factor*

The conversion factor at which the accumulated old-age credits within the mandatory part of the second pillar are translated into a lifelong annuity is regulated by the law. Table 5 in chapter II shows the evolution of this rate over the last 20 years, as well as its likely values in the next ten years after the last reform. It is important to mention that the conversion factor is *directly regulated*, that is not by means of a regulated discount rate and prescribed mortality tables.

However, there are important exceptions to this rule, as had been mentioned before. Autonomous pension funds can reduce the conversion factor, provided the unused resources are devoted to an increase in the benefits in some alternative way, such as inflation indexing and early retirement benefits. This is usually not an option for insurance companies which

[28] There have been several attempts by employees' associations to increase the rate to much higher market returns in the early 1990s. The rate was only adjusted after the fall in market returns to below the minimum interest rate at the turn of the century.

take care of the occupational pension schemes for smaller companies. There are no formal restrictions with respect to the design of such additional benefits.

There are no rules for the adjustment of the conversion factor for early retirement benefits in the BVG law. So pension funds are free to offer any early retirement conditions without legal restrictions. In theory, it would be possible for a pension provider to use a very low conversion factor for all retirement ages below the statutory retirement age, though we know of no cases in which this had been done. Common practice is to reduce the conversion factor by 0.2 percent for every year of anticipation of benefits[29]. However, there are again large differences in the early retirement plans across pension funds.

## 3.2 Minimum Interest Rate Requirement under BVG

The accumulated old–age balances in the second pillar enjoy a guaranteed minimum interest rate. This minimum rate of return is periodically reassessed by the Swiss Federal Council. Table 8 shows the evolution of the minimum interest rate (MIR). It remained constant at 4 percent for 17 years, until the end of 2002. Due to the decline of capital market returns, the previous rate was no longer sustainable and was therefore adjusted by the Swiss Federal Council. Currently, the rate is fixed at 2.5 percent.

**Table 8 Evolution BVG Minimum Interest Rate**

| | 1985 - 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|
| Min. interest rate | 4% | 3.25% | 2.25% | 2.5% |

Source: Bundesamt für Sozialversicherungen

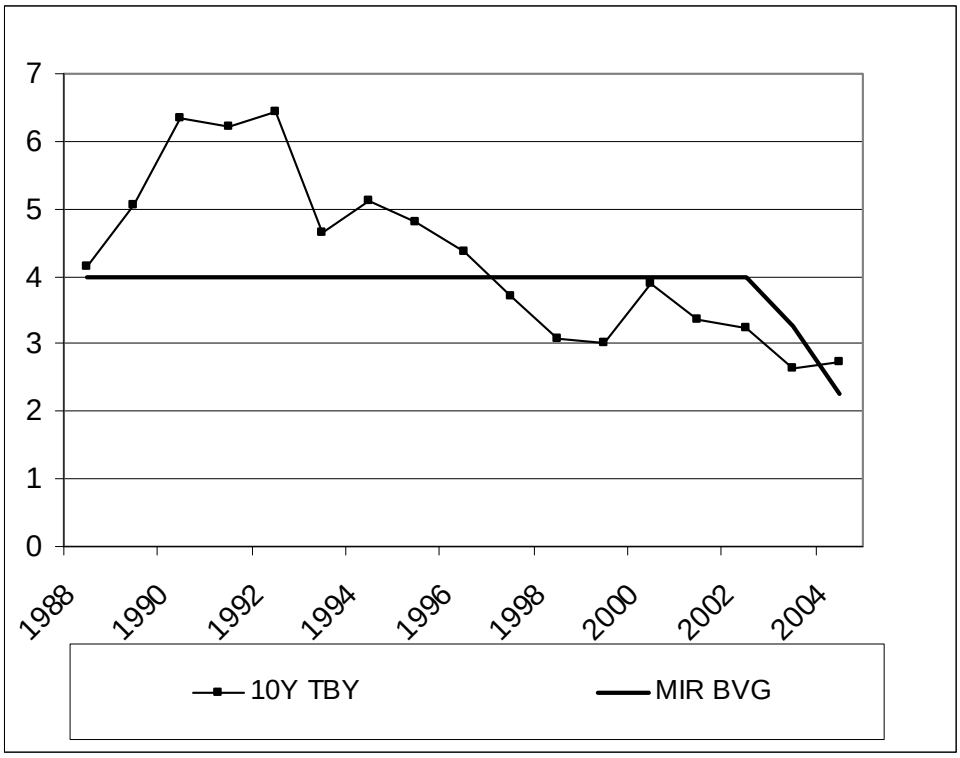
The minimum interest rate is supposed to reflect market conditions from a relatively risk–averse perspective. If the minimum requirement is set too high, portfolio managers have to take excessive risks, for higher expected returns are only attainable with a riskier portfolio. In order to avoid such an undesirable behavior and to protect the insured persons effectively, the MIR should be linked in some way to the risk–free rate of return on financial assets.

To illustrate the evolution of market interest rates with respect to the minimum interest rate, Figure 13 shows the MIR and a Swiss zero coupon government bond with duration of 10 years[30]. Until 1996, the yield on fixed income investments with a duration of 10 years, represented here by the Swiss zero coupon government bond, was much higher than the minimum interest rate under the BVG. Thereafter, it was the other way round until the minimum interest rate requirement was adjusted downwards.

[29] This number can be derived from an actuarially fair adjustment of benefits of 6.8 percent and a technical interest rate of 4%.

[30] Definitions: The Macaulay Duration is the weighted average maturity of e.g., a bond or series of cash flows received.

**Figure 13 Market Rate and Minimal Interest Rate Requirement**



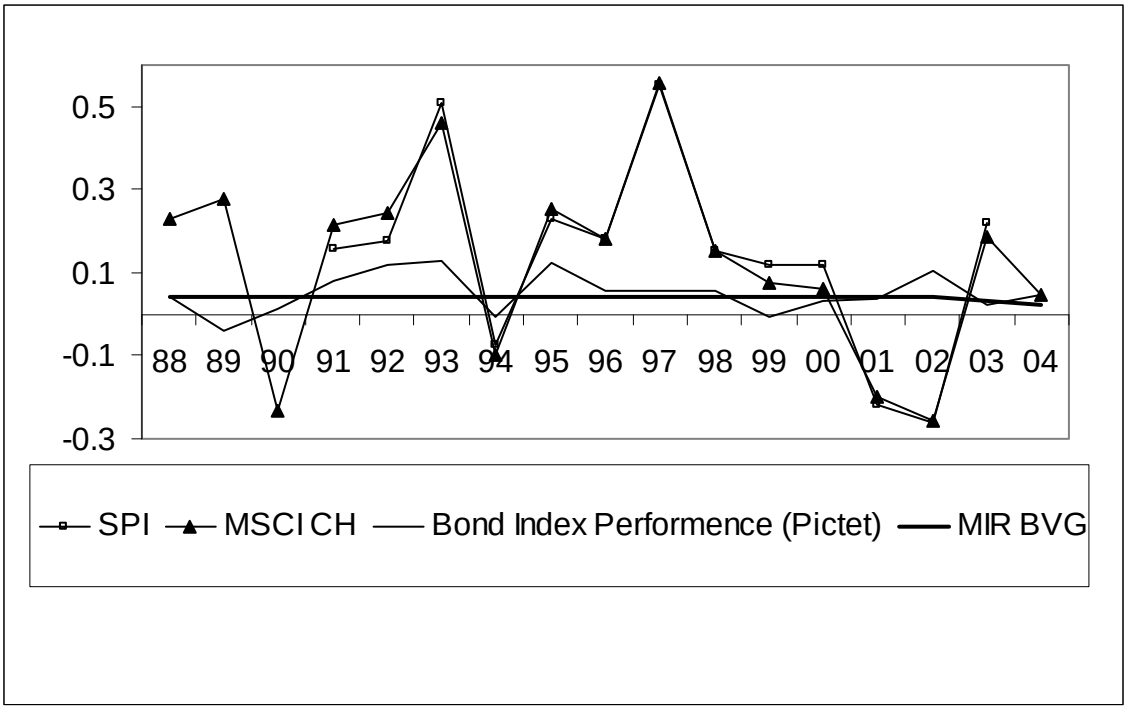

Data-Source: SNB for the yields on 10-year zero-coupon bonds for Switzerland (10Y TBY)

### *3.2.1 Comparison of Returns on Investment*

Portfolios of pension funds may also take advantage of potentially higher returns in stock markets by including risky assets. Figure 14 depicts the annual returns of the Swiss Performance Index (SPI), the Morgan Stanley Capital International Index (MSCI) for Switzerland, a bond index from Pictet[31] and the MIR. As riskier assets are associated with higher volatilities, the returns of the SPI and the MSCI index fluctuate more than the bond index.

[31]Bonds: Pictet Sub-index "Domestic Bond Index" with coupon interest payments incorporated; the index is based on a sufficiently representative random sample covering 5 different classes of bond issuer according to their market capitalization.

**Figure 14 Market Returns on Risky and Risk Free Assets**

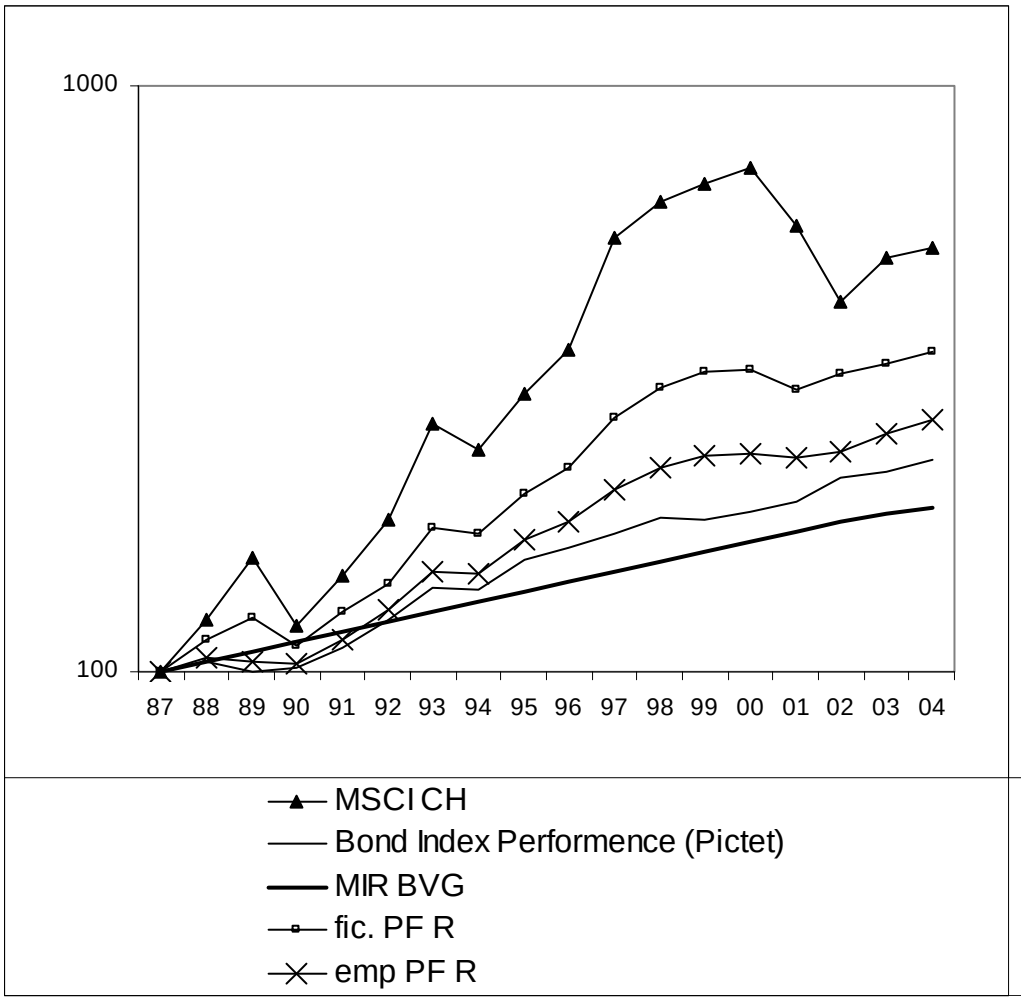



Data-Source: SNB, MSCI, SWX and Pictet

Figure 15 depicts the accumulated returns of these indexes, as well as of a "simulated portfolio" and an "average empirical portfolio" since 1987. The simulated portfolio comprises 30 percent Swiss shares (represented by the MSCI Index), 20 percent foreign shares (MSCI World), and 50 percent bonds, thus containing the maximal fraction of shares permitted by the BVG law in the mandatory part. The average empirical portfolio consists of the average reported fraction of shares held in an average portfolio of a pension fund. The remaining fraction is invested in bonds. The yields on portfolios of pension funds outperform the MIR yields on average. The performance ratios, which are presented in Table 9, represent the return to a portfolio relative to an investment strategy with a fixed yield of 4 percent and an investment period from 1987 to 2004. In this setting, the empirical portfolio exceeded by 42 percent the return of an investment strategy with a fixed yield of 4 percent. By investing the maximum fraction in shares at all times, an excess return of 84 percent could have been achieved.

However, it is important to note that the MIR does not necessarily represent the effectively credited return on old-age balances. Nonetheless, most pension funds used this rate to calculate the returns on the old–age capital. Excess returns in the past had been used to accumulate reserves, to finance early retirement programs and inflation indexing, and to take contribution holidays.

**Figure 15 Cumulative Returns (i.e. Cumulative Log Returns)**




Data-Source: SNB, MSCI and Pictet

**Table 9 Ratio of Investment Portfolio Returns to MIR**

| | Ratio over MIR | Annual Excess Return |
|---|---|---|
| MIR BVG | 100% | |
| Bond Index Performance (Pictet) | 121% | 1.12% |
| Empirical Portfolio | 142% | 2.07% |
| Simulated Portfolio | 184% | 3.66% |
| MSCI CH | 279% | 6.23% |

Source: Authors' Calculations

### *3.2.2 How Is the Minimum Interest Rate Determined?*

As of today, the Swiss Federal Council sets the Minimum Interest Rate in a discretionary way. This procedure has disadvantages as to the adequacy of this requirement. Firstly, the discretion may lead (and has led) to considerable pressure on the Swiss Federal Council from insurance companies, pension funds and contributing workers. The last 20

years have shown that there is a striking asymmetry as to the specification of the rate. High risk-free nominal interest rates have not pushed up the MIR despite the fact that for some time the MIR was even below the inflation rate. The fall in market returns, however, was accompanied by strong pressure on the Federal Council by insurance companies. This asymmetry can be well explained by interest group arguments. Secondly, it is unclear on what criteria the decision is based. It is thus difficult for pension funds to assess future liabilities.

In the current political debate, many players voiced a preference for a simple transparent rule to fix MIR, isolating the requirement from political pressure and making the choice more transparent. Nonetheless, no consensus has emerged so far as to what criteria should be applied to automatically determine the investment rate.

### 3.3 Investment Regulations of Pension Funds

Investments made by pension funds are regulated both with respect to the type of securities permitted to invest in, and with respect to the relative amount of money that can be invested in these securities. Assets can be classified as *cash, accounts receivable related to cash, real estate, investments in real estate companies, as well as shares, participation and profit certificates.* The quantitative investment rules include limitations on instruments and issuers. An overview is given in Table 10. There are restrictions on each class of assets (upper panel in Table 10) as well as restrictions on the distribution of the overall capital invested (lower panel in Table 10). The limitations on investments are not very restrictive, so that they hardly seem to be binding in practice.

There are also rules on collective investments, on the use of derivatives and, finally, on the investment in securities issued by the sponsor of the plan. All assets on a fixed cash amount are valued at their face value at most. On the other hand, real estate, shares and participation certificates are valued at their market value as a maximum. None of these rules depend on the form of pension funds and are therefore equally and legally binding for all types of funds.

### 3.4 Capital Regulation of Pension Funds

As part of the Occupational Pension Law (BVG), the Swiss Federal Council is obliged to define minimum capital requirements for pension funds. This rule concerns especially provisions for actuarial risks, other provisions and reserves needed to cushion fluctuations in the value of assets. These new rules were only enacted in January 2005. No detailed implementation regulations have been issued yet.[32]

[32]This is due to the fact that it has not been possible yet to find the appropriate minimum requirements fair to all the different forms of pension funds.

**Table 10 Investment Restrictions on Pension Funds**

| | Quantitative Restrictions on single Asset Classes[33] | | Restrictions on Issuers |
|---|---|---|---|
| 100% | Accounts receivables related to Swiss issuers | 15% | except for issuers as<br>The Government, Cantons, Banks or Insurance Comp. |
| 75% | Real Securities | | |
| 50% | Real estate (Swiss) and investments in real estate companies (with at least 50% invested in Switzerland) | | |
| 30% | Swiss shares | 10% | Per company |
| 30% | Accounts receivables related to foreign issuers | 5% | Per issuer |
| 20% | Currencies and convertible currency receivables | 5% | Per debtor |
| 25% | Foreign shares | 5% | Per company |
| 5% | Foreign real estate and investments in real estate companies (with at least 50% invested abroad) | | |
| | Quantitative Restrictions on the total of invested capital[34] | | |
| 100% | Cash and accounts receivables that are related to cash | | |
| 70% | Real estate, Shares and other Securities | | |
| 50% | Swiss and foreign shares | | |
| 30% | Accounts receivables related to foreign issuers and currencies and convertible currency receivables | | |
| 30% | Currencies and convertible currency receivables and foreign shares | | |

Source: Bundesamt für Sozialversicherungen

Autonomous pension funds are allowed to have a temporary under-funding (c.f., Section 5.4). The missing implementation regulations are thus not crucially important in the short run. On the other hand, life insurance companies are not allowed to have any under-funding. They are subject to more complex capital requirement rules.

The capital regulations of life insurance companies comprise general rules, which are legally binding for all life insurance companies, and specific rules for those which act in the realm of old–age provisions. The specific rules are listed in Section 3.5. The main feature of the so–called transparency standards is that life insurance companies must build up a separate *Security Fund* for their liabilities related to old–age provisions (see below). Another important new feature is the asset segregation rule, which requests the separation of assets belonging to the pension funds from other assets.

[33] c.f. Art. 54 BVV
[34] c.f. Art. 55 BVV

The general capital rules (i.e., rules that have to be met by all insurance companies including those offering services in the second pillar) are as follows:

- The minimum initial capital is specified at a range from 5 to 10 million CHF, depending on the anticipated business volume.
- The s*olvency margin* defines the own free capital that a life insurance company must hold, in case the amount of the necessary solvency margin exceeds the minimum initial capital. Its specific level depends on the business volume and the risk exposure of the insurer. The first component of the solvency margin amounts to 4 percent of the technical reserves times the fraction of the business volume not covered by a reinsurance company. The second component is a function of the different risk-capital positions that is not reinsured.
- To finance an extraordinary expansion of the business, the insurance company is obliged to invest up to 50 percent of the minimum initial capital in an *Organization Fund*.
- Insurance companies have to legally bind certain assets to ensure the security of policyholders' claims. The corresponding amount, which has to be invested in a so–called *Security Fund*[35], is mainly determined by the legally required capital (i.e., the actuarial reserves) and is verified by the supervisory authority on a regular basis. In case of an under-funding of the security fund, the insurance company is obliged to cover the shortfall within one month. If the insurance company goes bankrupt, however, the insured workers and retirees have a privileged claim on the value of the security fund.

Table 11 provides an overview on the total provisions for the insurer's own account[36], and the percentage that is attributed to old–age provisions. In 2003, the total provisions for own account amounted to 229 billion CHF, of which 54 percent were related to old–age provisions. Table 11 also presents the total amount invested in the insurers' security funds. The actual amount invested in the security funds always exceeds the required sum. Assets invested in the security funds are subject to special investment regulations and stricter valuation rules.

**Table 11 Provisions for Own Account and the Security Fund**

| | Provisions for Own Account | | | Security Fund | | |
|---|---|---|---|---|---|---|
| in bn CHF | Total | Old-Age Provision | % | Required | Actual | % |
| 1997 | 167,5 | 87,8 | 52.45% | 161,5 | 181,7 | 112.53% |
| 1998 | 188,6 | 96,6 | 51.20% | 182,8 | 200,3 | 109.58% |
| 1999 | 204,6 | 104,8 | 51.23% | 195,4 | 211,5 | 108.25% |
| 2000 | 217,4 | 114,1 | 52.47% | 209,0 | 218,5 | 104.54% |
| 2001 | 224,8 | 119,3 | 53.09% | 215,4 | 221,9 | 103.03% |
| 2002 | 228,2 | 122,3 | 53.61% | 218,4 | 225,1 | 103.12% |
| 2003 | 229,1 | 123,7 | 54.00% | 221,0 | 228,8 | 103.54% |

Source: Bundesamt für Privatversicherungen (2003), p.64 sqq.

[35] in German: Sicherungsfonds

[36] In German: Versicherungstechnische Rückstellungen für eigene Rechnung

### 3.5 Transparency in the Occupational Old–age Provision

A lack of transparency can lead to two important problems. First, the insurance companies may be ineffectively supervised and may decide on investment/contribution strategies that are detrimental to the interest of the insured employees. Second, individuals who are not aware of their fund's financial situation may find it difficult to make the best decisions such as (not) changing jobs and accumulating enough private savings.

In April 2004, new standards of transparency were enacted, which are legally binding for all the players in the field of old–age provision. All workers and pensioners affiliated to a pension provider must be sufficiently informed about the financial situation of the fund.

The main additions to the law refer to life insurance companies. The new transparency standards comprise mainly three regulations:

1. Life insurance companies must build up a separate *Security Fund* for their liabilities related to the old–age provision. Before the different businesses within a life insurance company could share a security fund.
2. The old–age provision business must be reported in a separate annual report.
3. Rules regulating the distribution of profit sharing were created. Moreover, a *Legal Quote* was introduced. According to this rule, at least 90 percent of the net yields must flow back to the insured individuals.

The *Legal Quote* was set at 90 percent in order to still guarantee some competition. Hence, the remaining 10 percent can be used by the insurer to build up solvency and risk capital, which are considered necessary to stay in this business and to protect insured individuals against risks.

The regulator, in this case the BPV/OFAP[37], completes the task of supervising the insurance companies and it is also responsible for the implementation of the new standards.

### 3.6 Other Regulatory Aspects

Organization and Administration:

Each pension fund that offers insurance within the mandatory part of the second pillar needs to be registered. Furthermore, it must be organized in the form of a foundation or a cooperative. Pension funds under public law, however, are exempt from this rule. Apart from these requirements, pension funds are free to design (but still within the limits of the pension law) their benefits, their funding, as well as their organization. Employers and employees appoint the same number of representatives to the administrative management.

Supervision:

[37]BPV = Bundesamt für Privatversicherungen / OFAP = Office fédéral des assurances privées

Supervision of occupational pension institutions is overseen by the Swiss Federal Council. Pension institutions without national or international importance are supervised by cantonal supervisory authorities.[38] The Federal Office for Social Insurance supervises the cantonal supervisory authorities, as well as pension providers with national or international importance. Moreover, the Federal Office for Social Insurance is also in charge of the so–called Suppletory Institution, and even more importantly, of the BVG/LPP *Guarantee Fund.*[39] It is worth noting that the different layers and the large segmentation of the supervisory authority potentially reduce the quality and transparency of supervision.

In case the supervisors detect some irregularities, a pension fund will not be penalized, even in the presence of severe problems, such as under-funding (insurance companies are only requested to correct the under-funding within one month). The pension funds will merely be invited to correct the unfavorable situation without setting deadlines. Certain issues, like recovering from a funding gap, can therefore take several years. Consequently, there are no penalization rules either for duration gaps in the asset and liability management. Sanctions concern only violations against the obligation to disclose information, the disclosure of false information, the avoidance of control and the misuse of contributions. The fines for such violations reach from 10,000 to 30,000 CHF.

Suppletory Institution and Guarantee Fund:

The *Suppletory Institution* covers individuals seeking insurance on a voluntary basis, in particular self-employed individuals, as well as employees whose employer is not affiliated with an occupational pension provider despite the legal provisions. Finally, it fulfils the task of insuring the recipients of unemployment compensation against the risk of death or disability. The Suppletory Institution is considered a pension fund. It is financed by all concerned parties, like any other pension fund with the exception of some special costs that are covered by the Guarantee Fund.

The most important task of the *Guarantee Fund* is to act as a reinsurance institution for the beneficiaries of insolvent pension providers.[40] It covers workers during the accumulation phase as well as pensioners with annuities up to 150 percent of the corresponding value of the mandatory part. A worker, whose pension fund goes bankrupt, receives the capital accumulated by contributions on the coordinated salary plus up to an additional 50 percent if he/she has contributed to a super-mandatory part. A pensioner receives the annuity corresponding to the mandatory part of the insurance, plus again up to 50 percent more in case of a super-mandatory insurance.

The Guarantee Fund also subsidizes pension funds with an unfavorable age structure (an important issue at the onset of the mandatory occupational system), and reimburses the Suppletory Institution for its special expenditures.

The fund is financed on a pay-as-you-go basis and does not primarily accumulate

[38] The 26 cantons are the Swiss states. They enjoy considerable independence from the confederation in many important areas, such as tax setting, schooling, and regulation.
[39] Sicherheitsfonds
[40] Insolvent pension funds were liquidated by the regulatory agency.

reserves. In the past, its reserves have always been less than 1/10 of the total accumulated retirement assets in Switzerland, and were even negative at times. The contribution rate is 0.1 percent of the coordinated earnings at present. The PAYG financing has a major downside. To cover its obligations in bad times, the fund might have to increase the contribution rate when the individual funds face greater difficulties financing their primary obligations. If the Guarantee Fund faces a liquidity problem itself, the government can grant a (conditional) loan.

# IV. MONEY'S WORTH RATIOS

This chapter presents estimates of annuity values in Switzerland since 2000. The computed Money's Worth Ratios (MWRs) correspond to annuity values in the occupational pension pillar. Due to the large size of this system, there is a little scope for an annuity market in the third pillar. The second pillar annuities make up for more than 99 percent of all (funded) pension payments paid out in Switzerland.[41]

Annuity prices within the mandatory second pillar are regulated to a large extent. The corresponding money values of annuities are determined by direct regulation on the one hand and by discount rates and mortality rates on the other hand. As outlined before, the law specifies the conversion factor at which the accumulated pension capital of the second pillar's mandatory part has to be converted into a life long annuity. However, as has been discussed in the previous chapters, pension funds, but not insurance companies, are allowed to deviate from the legal value under certain conditions. Moreover, for the capital exceeding the mandatory part, pension funds are free to set the rate at which the capital is converted.

Until very recently, however, most pension funds did not distinguish between the two components of the accumulated old age capital. As a consequence of the fall in market returns and the difficulty to meet the prescribed funding standards, more and more funds are reducing the conversion factor in the non-mandatory part. However, there is little publicly available information on the pricing of this part, although we do report some calculations using the recently published rates of some large insurance companies. The computed MWRs using the notional conversion factor will be too high on average.

Money's worth ratios crucially depend on the discount rates and the underlying mortality rates. While problems with the latter, discussed in more details in section 4.1 below, do not differ from other countries, the correct specification of the used discount rates is more controversial. All occupational pension benefits are nominal CHF-denominated annuities. Annuities are usually *not* indexed to inflation, but pension funds are required to adjust the benefits to increases in the price level if the financial situation of the pension fund allows it.[42] In this chapter we thus compute MWRs assuming a *nominal* annuity and nominal discount rates. The main reasons for this approach are, as will be explained in more detail below in section 4.2, a very low inflation rate in recent years, the non-availability of reliable real yield curves, and the factual non-indexation of annuities by most pension providers.

Within the second pillar there are no variable annuities or annuities denominated in other currencies than the Swiss franc. While variable annuities are clearly inconsistent with

[41] Meader gives an overview on the issue of Longevity and Annuities in Switzerland and Brown et al. (2001) discuss the history of annuity markets in the United States and their role in an individual accounts retirement program, new evidence on MWR's, the cost of annuitizing retirement payouts and some tax issues.

[42] In the 1980s and 1990s with much higher levels of inflation and low required returns on accumulated pension capital, adjustment of benefits to inflation was almost standard.

the BVG law, the case is less clear for the latter. To the best of our knowledge annuities in other currencies have not been offered so far, very likely due to a lack of demand. Similarly, there are no guaranteed or deferred annuities in the second pillar. The market for these products outside the second pillar is simply too small to allow for a meaningful analysis.

By using the nominal yield curves, on the one hand, and a relatively high technical discount rate, on the other hand, the chapter provides reliable upper and lower bands for the MWRs of non-indexed annuities derived by using the legal conversion rate. For companies which use a lower conversion factor but promise inflation indexing, the situation is a bit more complicated. The effective MWR depends on how much inflation indexing offsets the fall in the MWR generated by a lower conversion factor. Nevertheless, we think that the exercise can deliver a reasonable approximation of the return to the accumulated pension capital for insured individuals in the mandatory part of the scheme.

The chapter first presents the underlying mortality rates and the discounting strategy. It then presents a variety of estimates for MWRs in the second pillar for women and men since 2000. As the survivor component of the second pillar benefits is free, we also present MWRs as a function of the marital status, demonstrating large differences in the present value of benefits between single and married individuals.

## 4.1 Mortality Rates

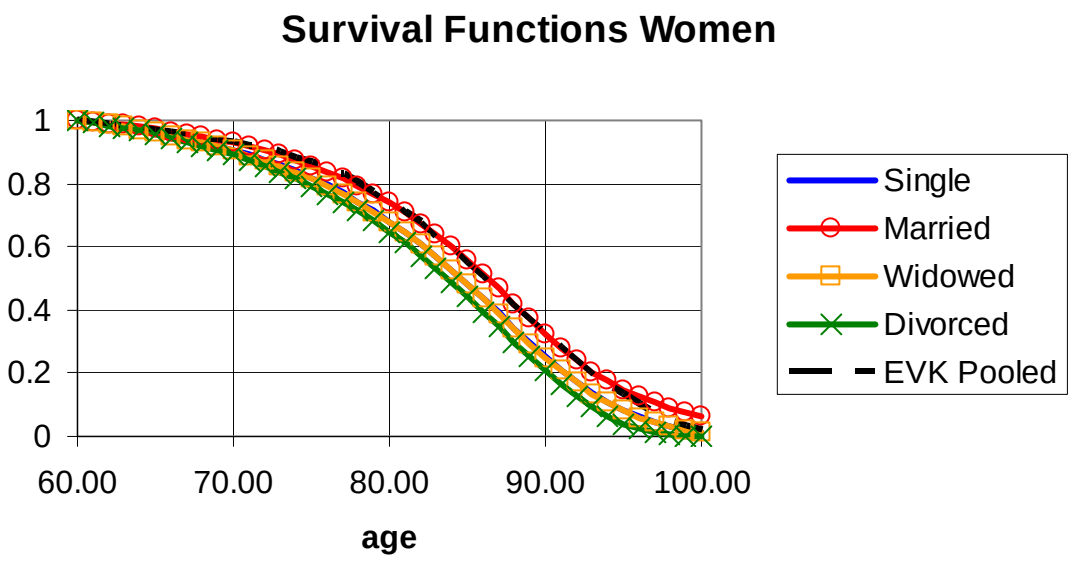
Mortality rates are used from two sources, the Federal Insurance Fund (FIF) and the Swiss Federal Statistical Office (SFSO). In both cases, these are *period tables*. The quality of these tables is regarded as high by pension fund experts.

1. *The Federal Insurance Fund (FIF)*
Every ten years, the Federal Insurance Fund (FIF) provides detailed data on the evolution of mortality rates and other risks (disability, widowhood) based on the pool of insured individuals on pension funds under the control of the FIF. These are used by the vast majority of pension funds, including the large insurance companies.[43] The clear advantage of the FIF tables is that they are based on the annuitant population.

2. *Swiss Federal Statistical Office (SFSO)*
We also use the mortality tables computed by the SFSO in ten years intervals. The advantage of the SFSO data is that it is computed from a much larger base than the FIF rates. As a consequence, improvement rates computed from this source are more reliable and less variable. SFSO mortality tables are also available by marital status (c.f. Figure 16 and Figure 17 for women and men, respectively). On the other hand, the SFSO mortality tables underestimate longevity to some extent, as they are based on the whole population and not just the annuitants.

[43] In German: “Eidgenössische Versicherungskasse (EVK)”, in French: “Caisse fédérale d’assurance (CFA)”. Until recently the Federal Insurance Fund (FIF) also managed the Federal Pension Fund (FPF). Furthermore it created the new Federal Pension Fund PUBLICA. The latter was legally established in spring 2001 and began operating in June 2003.

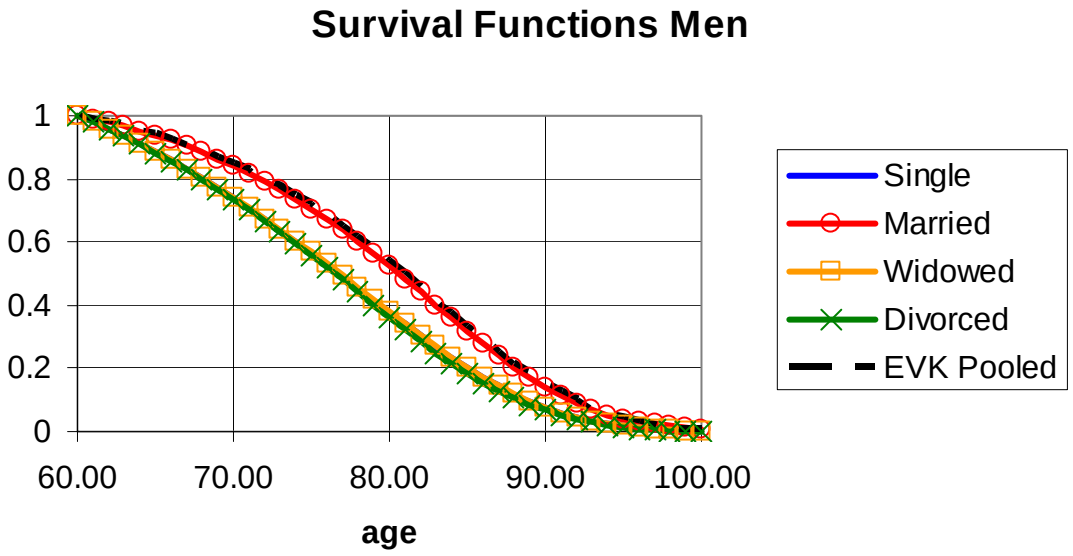
**Figure 16 Women Survival Rates**




Survival rates as a function of marital status for women (year 1990, data source SFSO). The dashed line corresponds to pooled annuitant survival rates provided by the FIF (1990).

Source: SFSO, FIF

**Figure 17 Men Survival Rates**




Survival rates as a function of marital status for men (year 1990, data source SFSO). The dashed line corresponds to pooled annuitant survival rates provided by the FIF (1990).

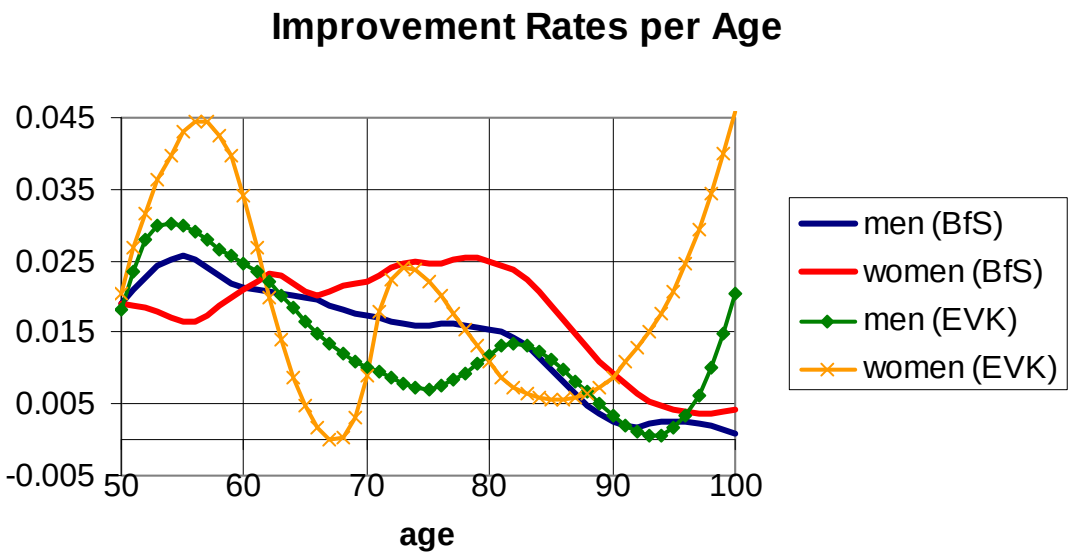
Source: SFSO, FIF

### *4.1.1 Mortality Improvement Rates*

As already mentioned, improvement rates can be computed from both sources (both of which are available at 10-year intervals). As can be seen from Figure 18, the improvements are similar, although the FIF data exhibits greater variability with age, most probably due to the relatively small number of annuitants on which the mortality rate estimates are based. For the computation of MWRs the difference does not seem to be quantitatively important. The reported numbers in this chapter are derived with population improvement rates.

It is important to mention that most pension funds do not update the mortality rates on a yearly base. They compute the liabilities based on the published FIF mortality rates and increase these by 0.4 percent to 0.5 percent on a yearly basis until the new FIF mortality rates are available, i.e., every 10 years. The 0.4 percent per year delivers an increase in longevity over 10 years that coincides almost exactly with the increase in longevity using the SFSO or FIF improvement rates for all groups of annuitants. It thus constitutes a good approximation for the anticipated increase in longevity. The 0.5 percent is a more prudent estimate.

**Figure 18 Mortality Improvement Rates**




Improvement rates per year computed from pooled mortality rates. SFSO = between 1980 and 1990, FIF = between 1990 and 2000.
Source: SFSO, FIF

## 4.2 Yield Curves and Discount Rates

The choice of the discount rate in Switzerland is somewhat tricky due to the specificities mentioned below. We will use three different strategies to discount the annuity streams:

1. The nominal yield curve.
2. The return on a 5-year bond.
3. The technical discount factor.

As has been explained, this rate is *not* regulated per se, but corresponds to the customary rate used in the computation of pension liabilities and reserves. It should reflect an average *long-run* return on capital. Most pension providers now use a rate of 3.5 percent (or 3.25 percent), a number below the semi-official rate of 4 percent that had been used until recently.

Our *nominal yield curves* are sourced from the central bank and are depicted in Figure 19 for end of June since 2000. The low level of interest rates reflects three particularities of the Swiss economy:

1. The traditionally low average inflation rates in Switzerland. Inflation has been even lower than usual in the last few years. As the yield curves suggest, inflation expectations are equally low.
2. A low real interest rate compared to neighboring countries. The Swiss real interest rates have been approximately one to two percentage points lower, on average, than in Germany.[44]
3. The extended period of sluggish growth since the early 1990s. Switzerland has experienced very low growth rates in recent years.

*Real yield curves* cannot be computed due to the nonexistence of inflation-indexed bonds in Switzerland. The lack of the latter financial instrument reflects the high stability of monetary policy in Switzerland and thus the low demand for an inflation hedge. While this shortcoming does not pose a problem for estimates of MWRs since approximately 2000, it makes it difficult to value the annuities before 2000, when second pillar benefits were factually indexed to inflation.

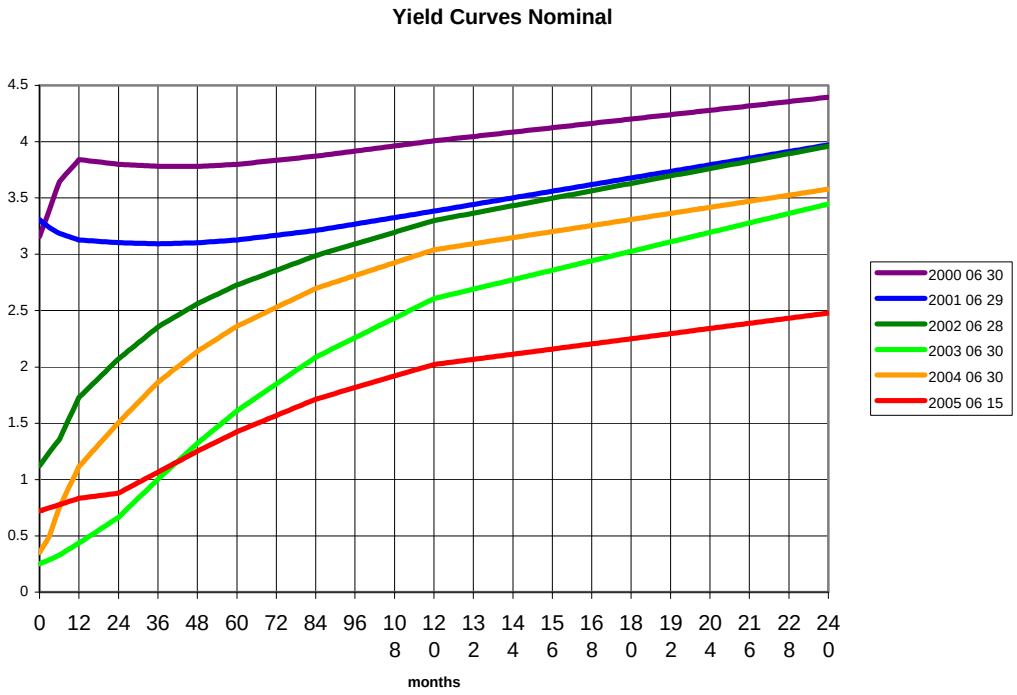
As a consequence, we use *nominal* yield curves or nominal discount rates together with nominal (non-indexed) annuities to compute the MWRs. Inflation has been very low in recent years, and indexing is rare, especially in funds using the statutory conversion factor. However, the use of the nominal yield curve is not free of problems either. Firstly, due to the interest rate differential with neighboring countries, a higher return on assets can be achieved at relatively low cost. The exchange between the Euro zone and Switzerland has been very stable for a long time, including the pre-Euro time. A well diversified portfolio of bonds can thus generate a considerably higher return at almost no additional risk. Secondly, it ignores one of the main objectives of the Swiss pension system to keep benefits relatively stable over time for different cohorts of pensioners. To get a more precise picture one would have to average out MWRs over a longer spell. Thirdly, the use of the nominal yield curve ignores the possibility that annuities may be partially adjusted to inflation if the latter reaches a sufficiently high level.

The MWRs computed with a constant nominal interest rate of 3.5 percent understate

[44] See, for example, Kugler und Weber (2002) and (2003)

the value of the annuity, those using the nominal yield curve and the 5-year bond most likely overstate the true value, as they do not take into account the possibility of a well-diversified portfolio with a higher return.

**Figure 19 Nominal yield curves since 2000**




Nominal yield curves since 2000 (June 30 of each year, June 15 in 2005). The corresponding inflation rates are 1.84 (2000), 1.58 (2001), 0.33 (2002), 0.55 (2003), 1.12 (2004), and 1.08 (2005).
Source: Swiss National Bank.

## 4.3 Money's Worth Ratios in the Swiss System

Recall that occupational pension benefits are strictly proportional to the accumulated retirement assets (retirement credits plus accrued interest). The accumulated capital $K$ is translated into a yearly pension $B$ using the conversion factor $\gamma$:[45]

$$B = \gamma\ K$$

The BVG/LPP mandates joint annuities for men, but not for women. The conversion factor is the same for everybody irrespective of gender, family status or income. Children under age 18 (or under age 25 if still dependent) of retired persons get an additional pension of 20 percent of the main claimant's benefit. When a retired individual dies, his/her surviving spouse receives a benefit amounting to 60 percent of the previous pension, his dependent children a benefit of 20 percent each. These survivor benefits are not means tested.

[45] This conversion also applies to defined benefit plans; the fund has to make sure that enough capital is accumulated to cover the claims made based on previous income.

The conversion factor has become the *key parameter* of the Swiss occupational pension system. Contracts for annuities in the non-mandatory part have started to be specified in terms of applicable conversion factors (which, in this case, can be different for men and women).

Recall that a pension fund can deviate from the legal conversion factor even in the mandatory part if it uses the freed resources to improve the benefits for the covered individuals. Due to the large number of pension funds and the lack of readily available detailed data, it is very difficult to obtain reliable information on how this affects the implied conversion factor for different groups of insured individuals. This problem is exacerbated by the fact that pension providers are required to use the additional resources to increase benefits. Unless we know, how this is done, the computation of MWRs is impossible for funds with a lower conversion factor, but other relevant benefits.

### *4.3.1 Computations of Money's Worth Ratios*

To compute the MWRs in the Swiss second pillar, let us introduce the following notation: $M$ is the main claimant, i.e., the person who has accumulated the claim to the pension system, and $S$ is his/her spouse. The pensioner's spouse $S$ is $d$ years older than the main claimant. $M$ retires at age $J$ with an accumulated capital stock of $K$.[46] Upon retirement, the accumulated capital is either withdrawn as a lump sum or translated into a life–long annuity using the age–dependent conversion factor $\gamma$, defined as

$$\gamma = \frac{B}{K} \qquad (1)$$

In case $M$ dies and is survived by his/her spouse $S$, the latter gets a survivor benefit, which is a certain fraction $\lambda$ of the main benefit $B$. For single, divorced or widowed agents, the analysis is similar, though much simpler, as joint survival probabilities do not have to be taken into account.

When computing the MWR, we have to know the conditional probability of survival to age $J$ for both spouses. Survival probabilities are allowed to depend on marital status, and the joint probability of survival is a function of the age difference $d$ between the spouses. The discount rate is denoted $\rho$. The present value of all future benefits from retirement age on can be written as

$$PV = \frac{1}{\Psi_J^M} \sum_{t=J}^{\infty} \left( \frac{1}{1+\rho} \right)^{t-J} B \times \begin{cases} (\Pr[M \ \ alive, S \ \ alive](t)) \\ +(\Pr[M \ \ alive, S \ \ dead](t)) \\ +(\Pr[M \ \ dead, S \ \ alive](t) \times \lambda) \end{cases} \qquad (2)$$

where $\Psi_J^M$ is the probability of the main claimant being alive at age $J$. Combining (2) with

[46] In a defined benefit system, this is the implicitly defined capital stock that corresponds to the annuity. Note that many funds allow a partial withdrawal of capital even in a defined benefit system.

(1), we can then compute the MWR for a married individual without children:

$$MWR = \frac{PV}{K} = \frac{\gamma}{\Psi_J^M} \sum_{t=J}^{\infty} \left( \frac{1}{1+\rho} \right)^{t-J} B \times \begin{cases} (\Pr[M \ \ alive, S \ \ alive](t)) \\ +(\Pr[M \ \ alive, S \ \ dead](t)) \\ +(\Pr[M \ \ dead, S \ \ alive](t) \times \lambda) \end{cases} \quad (3)$$

The derivation for non-constant discount rate is similar, though slightly less elegant. In the presence of minor children the benefit level has to be increased by the corresponding numbers until the children reach the age of 18 (or 25 if still in school or unable to work).

Note that the pension funds use mortality rates that are pooled over all marital status, but of course use different tables for men and women. While the differences for female retirees are small (see Figure 16), there are sizeable differences in longevity across marital status for men (see Figure 17). Being without a partner in old age (regardless of this being caused by widowhood, divorce or never married) constitutes a major threat to a man's well-being and survival prospects in old age. Abstracting from survivor benefits, differential mortality accounts for a difference of at least 10 percent in the MWR between married and non-married men. See also the discussion below in section 4.3.4 Mortality Tables by Marital Status.

A MWR exceeding one (or one minus a certain amount to cover administration costs) would not be sustainable for the pension provider operating with risk-free assets alone. A value of 1.2, for example means that the conversion factor is at least 20 percent too high, given the used mortality tables and the underlying risk-free interest rate. As a consequence, the used conversion factor is too high by the same percentage. If the 1.2 was computed using a conversion factor of 7.2 percent, an actuarially fair and riskless conversion rate would be 6 percent, abstracting from administration costs. Recall, however, that a higher rate of return can be achieved using an appropriately diversified portfolio.

### *4.3.2 Money's Worth Ratios since 2000*

Table 12 reports the MWRs for retirees in the second pillar since 2000. As it is obvious from the Table, the numbers differ substantially from one year to another when using the nominal yield curve to discount future benefits. The most striking feature, however, is the average magnitude of MWRs. It is not surprising that many pension funds (especially the majority that still uses the legal conversion rate) have faced some difficulty in meeting the financial obligations. On the other hand, as is outlined above, discounting future income streams with the nominal Swiss bond yield overstates the true cost of an annuity to a certain extent.

The uniform conversion factor also leads to dramatically different outcomes for different subgroups of the population. In particular, female retirees fare substantially better due to the lower statutory retirement age. As the next section will show, this advantage will partially disappear with the recent reform of the second pillar. It is important to note that the reported numbers also overstate the difference in MWRs as many companies have used reserves to finance an equally early retirement age for men also. In some cases, the

advantage was even reversed, as male annuitants not only had access to full benefits at age 62, but also were granted a subsidy out of the fund to replace benefits from the first pillar.

Another striking feature is the difference between single and married men. Due to the uniform conversion rate, married men get a higher payoff generated by the present value of anticipated survivor benefits. The reported difference *underestimates* the true magnitude of the advantage for married men for two reasons: Firstly, the computations ignore mortality differences between married and non-married individuals. As Figure 17 shows, married men have a considerably longer expected life-span than single men (see also below). Secondly, married men can claim additional benefits for minor children (or children still in education) when reaching retirement.[47]

**Table 12 Money's Worth Ratios for Second Pillar Retirees**

| Year | Annuitant | SNB Yield Curve | 5-year Bond Rate | 5-year Bond MWR | Fixed 3.5% |
|---|---|---|---|---|---|
| 2000 | female single | 1.069 | 3.80% | 1.117 | 1.155 |
| | male single | 0.890 | | 0.917 | 0.943 |
| | male married | 1.025 | | 1.068 | 1.103 |
| 2001 | female single | 1.134 | 3.13% | 1.211 | 1.160 |
| | male single | 0.937 | | 0.981 | 0.947 |
| | male married | 1.086 | | 1.154 | 1.108 |
| 2002 | female single | 1.151 | 2.73% | 1.275 | 1.165 |
| | male single | 0.953 | | 1.023 | 0.951 |
| | male married | 1.102 | | 1.212 | 1.112 |
| 2003 | female single | 1.242 | 1.61% | 1.475 | 1.170 |
| | male single | 1.020 | | 1.152 | 0.955 |
| | male married | 1.187 | | 1.393 | 1.116 |
| 2004 | female single | 1.206 | 2.36% | 1.346 | 1.175 |
| | male single | 0.991 | | 1.071 | 0.959 |
| | male married | 1.152 | | 1.276 | 1.120 |
| 2005* | male single | 1.099 | 1.42% | 1.186 | 0.963 |
| | male married | 1.302 | | 1.440 | 1.124 |
| 2005 | female single (62), 5.454% | 1.039 | 1.42% | 1.076 | 0.893 |
| | male single, 5.835% | 0.891 | | 0.961 | 0.780 |
| | male married, 5.835% | 1.055 | | 1.167 | 0.911 |

MWR calculations for pooled gender survival tables as a function of the underlying risk free rate profile since 2000. For all computations, the common conversion factor is 7.2 percent, the female retirement age is 62, and the age difference of married spouses at retirement is 3.7 years. The last three lines (2005, in blue) depict the MWRs using the lowest quoted conversion rates to be applied on the non-mandatory capital stock. The computations are based on a constant nominal interest rate of 3.5 percent. Joint annuities are for men only Mortality rates are updated by improvement rates from SFSO. * = no females to retire at statutory retirement age.

Source: Authors' calculations

Given these numbers, it is surprising, that single men do not take the capital option

[47] Retired men with young children get a considerably higher income than younger families as children benefits do not exist for working individuals. Although no official statistics exist, evidence from a number of pension funds show that young children are predominantly registered for high income individuals. Together with differential mortality based on economic well-being, these additional benefits for children increase the true MWR for the latter substantially above the values reported in our tables.

more often. The data from a number of Swiss pension funds show that this is not the case. Bütler and Teppa (2005) argue that this may be due to a lack of alternative longevity insurance by the family, and an absence of a bequest motive. It is also not clear, how much individuals realize the large differences in the annuity values, especially as a uniform conversion factor suggests an equal treatment. Moreover, there are hardly any arbitrage opportunities (take the lump sum and buy a private annuity contract), as the offered conditions in private annuity contracts are rarely more favorable than those of second pillar providers even for single men, possibly due to selection effects.

### *4.3.3 The Recent Reform*

Table 13 reports the MWR based on the slowly decreasing conversion factors and the increase in the female retirement age over the next ten years, based on a flat discount rate of 3.5 percent. The overall picture is that despite the relatively high chosen discount rate, MWRs stay very high. The reduction in the conversion factor comes too late and is not large enough. As can be seen from the two columns "single male" and "joint", the reduction is barely able to compensate the expected increase in longevity over the next ten years. It is too small to offset the increase in life expectancy since 1985.

**Table 13 Projected Money's Worth Ratios**

| Year | Gender | R.A. | C.F. | Single female | | Single male | | Joint (F=61.3) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | FIF | (SFSO) | FIF | (SFSO) | FIF | (SFSO) |
| 2004 | F | 62 | 0.0720 | 1.175 | (1.191) | | | | |
| | M | 65 | 0.0720 | | | 0.959 | (0.904) | 1.120 | (1.104) |
| 2005* | M | 65 | 0.0715 | | | 0.952 | (0.902) | 1.117 | (1.110) |
| 2006 | F | 63 | 0.0715 | 1.148 | (1.153) | | | | |
| | M | 65 | 0.0710 | | | 0.953 | (0.899) | 1.113 | (1.096) |
| 2007** | F | 64 | 0.0720 | 1.133 | (1.144) | | | | |
| | M | 65 | 0.0710 | | | 0.957 | (0.904) | 1.117 | (1.100) |
| 2008 | F | 64 | 0.0710 | 1.122 | (1.132) | | | | |
| | M | 65 | 0.0705 | | | 0.954 | (0.901) | 1.113 | (1.097) |
| 2009 | F | 64 | 0.0700 | 1.111 | (1.120) | | | | |
| | M | 65 | 0.0705 | | | 0.958 | (0.905) | 1.117 | (1.100) |
| 2010 | F | 64 | 0.0695 | 1.107 | (1.116) | | | | |
| | M | 65 | 0.0700 | | | 0.955 | (0.903) | 1.112 | (1.096) |
| 2011 | F | 64 | 0.0690 | 1.103 | (1.112) | | | | |
| | M | 65 | 0.0695 | | | 0.952 | (0.900) | 1.108 | (1.092) |
| 2012 | F | 64 | 0.0685 | 1.099 | (1.108) | | | | |
| | M | 65 | 0.0690 | | | 0.948 | (0.898) | 1.104 | (1.088) |
| 2013 | F | 64 | 0.0680 | 1.095 | (1.104) | | | | |
| | M | 65 | 0.0685 | | | 0.945 | (0.895) | 1.099 | (1.084) |
| 2014 | F | 64 | 0.0680 | 1.098 | (1.108) | | | | |
| | M | 65 | 0.0680 | | | 0.941 | (0.892) | 1.095 | (1.079) |

MWRs for the conversion rates specified in the law. The computations are based on a constant nominal interest rate of 3.5 percent. Joint annuities are for men only (number in parentheses = age of spouse at retirement of main claimant). * = MWR for female is not reported as there are no women to reach the statutory retirement age. ** = women born in 1943 can choose to retire at 63 (at a slightly reduced conversion factor) or at age 64. Mortality rates taken from FIS and SFSO (in parenthesis), they are updated by improvement rates from SFSO.

Source: Authors' Calculations

On the other hand, the relative advantage of women compared to married men is disappearing with the higher female retirement age. Note again that the MWR computation based on pooled survival rates underestimates the MWR of joint annuities to a certain degree (especially also considering the fact that many married men can claim additional benefits for minor children at no cost). The MWRs for married female retirees are not reported here, due to data limitations. However, the increase in the MWR as a consequence of expected survivor benefits for insured women is relatively small. Preliminary calculations show that the joint annuity MWR for married women is approximately 3 to 4 percent. This number looks even smaller when considering the fact, that married women have a much lower average capital stock at retirement than other women (approximately half).

#### *4.3.4 Mortality Tables by Marital Status*

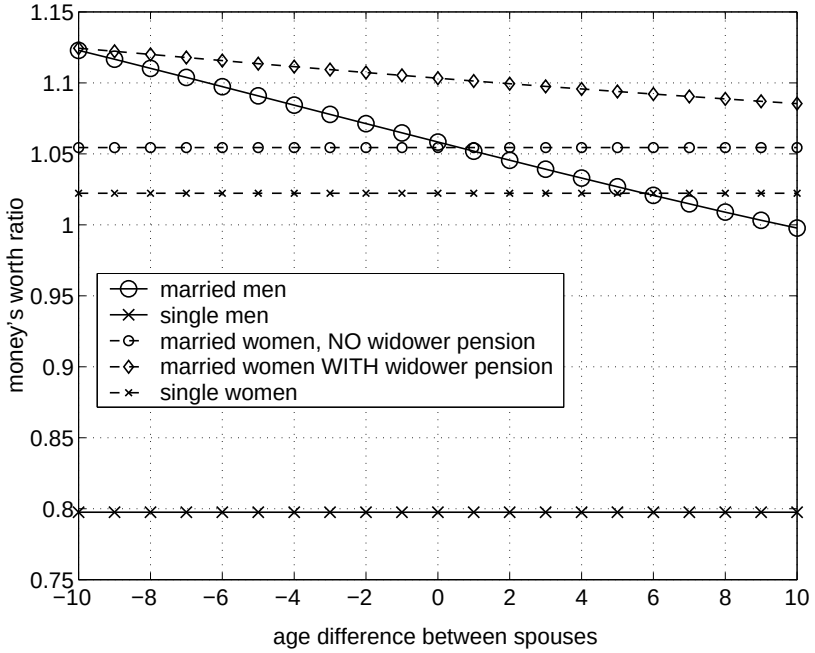
As Figure 16 and Figure 17 demonstrate, survival rates differ considerably across marital status, especially for men. MWRs computed from pooled mortality tables considerably overestimate the MWR for single, divorced and widowed men (having lower than average life-expectancy).[48] For married men, pooled data is likely to underestimate the MWR. Such considerations are especially important in the Swiss context with a uniform conversion factor for all individuals. The fact that single men have a lower life expectancy than married men reinforces their disadvantage of not having a second claimant in case of death.

A second component that has been ignored so far is the age difference between the retired spouses. A survivor benefit of 60 percent is of more value for a main claimant with a much younger spouse than for somebody with an older spouse. Although benefits can be reduced for spouses more than 10 years younger than the main beneficiary, few are and if so, in a very moderate fashion. That the age difference matters is illustrated in Figure 20 below. If the wife is 10 years younger, the implied MWR is approximately 7 percent higher than in the case of an equal age for both spouses. The age difference channel increases the relative advantage of beneficiaries with children as young children in retirement usually mean a much younger wife. For obvious reasons, this does not apply to female beneficiaries.

Unfortunately mortality tables by marital status do not exist for the annuitant population, but only for the general population. Nonetheless, the numbers computed for the year 2004 are impressive as Table 14 shows. While there is little difference to the previously discussed pooled tables in MWRs for women and married men, single men fare considerably worse when taking into account mortality differences. The Table also illustrates that the availability of a survivor pension increases the MWR by approximately 20 percent for married men, but only 3 percent for married women. However, more than 10 percent of the difference in MWRs between married and non-married men can be explained by differential mortality. This effect can also be observed for women, albeit to a much lesser degree.

[48]For men, mortality differences are negligible between divorced, single and widowed individuals. The new law allows survival benefits also for cohabiting couples (same or opposite sex), this amendment is likely to increase the MWR for single men to a limited degree.

**Figure 20 MWRs as a Function of Gender and Age**




Money's worth ratios as a function of gender and the age difference between spouses (horizontal axis; negative numbers mean than that spouse is younger). The figure is drawn for a retirement age of 62, a discount rate of 4 percent and a constant annuity.

Source: Authors' Calculations

**Table 14 MWRs as a Function of Marital Status**

| Year | Gender | R.A. | C.F. | FIF | SFSO pooled | SFSO marital |
|---|---|---|---|---|---|---|
| 2004 | | | | | | |
| | female pooled | 62 | 0.0720 | 1.175 | 1.191 | |
| | female married | 62 (65.7) | 0.0720 | | | 1.210 |
| | female married | 62 (—)[49] | 0.0720 | | | 1.171 |
| | female single | 62 | 0.0720 | | | 1.143 |
| | female divorced | 62 | 0.0720 | | | 1.108 |
| | female widowed | 62 | 0.0720 | | | 1.139 |
| | male married | 65 (61.3) | 0.0720 | 1.120 | 1.104 | 1.093 |
| | male married | 65 (55) | 0.0720 | | | 1.148 |
| | male married | 65 (—)[50] | 0.0720 | | | 0.896 |
| | male single | 65 | 0.0720 | 0.959 | red 0.904 | red 0.805 |
| | male divorced | 65 | 0.0720 | | | 0.796 |
| | male widowed | 65 | 0.0720 | | | 0.809 |

The computations are based on a constant nominal interest rate of 3.5 percent. The number in parenthesis corresponds to the age of the main claimant's spouse at retirement, and $\lambda = 0.6$. Mortality rates are updated by improvement rates from SFSO.

Source: Authors' Calculations

[49]Without survivor benefits
[50]Without survivor benefits

## 4.4 Discussion

MWRs in the Swiss second pillar are very high, exceeding one for women and married men even at a relatively high discount rate of 3.5 percent. Not surprisingly there is considerable pressure by pension funds and insurance companies to lower the conversion factor even for the mandatory part of the second pillar. Many autonomous funds have indeed already started to use lower conversion factors. The reported MWRs can thus be seen as upper bounds. As the computations show, the new conversion factors used by the insurance companies for the capital exceeding the mandatory level bring the numbers more closely to values computed with the nominal yield curve.

However, there are also certain caveats in our computations: The reported MWR correspond to the official picture as stated in the law. But under certain circumstances, the conversion factor requirement can be relaxed when the pension fund uses the newly available resources to increase the benefits of its retirees. Some pension funds also compute the level of pension payments based on conversion factors that are more in line with reality, financing the gap between the official and the internal factor with additional levies on employees and employer. Needless to say, it is very difficult to obtain confirmed information on this practice given the high fragmentation of the system.

As the MWRs demonstrate, uniform conversion factors redistribute resources on a remarkable scale. The main losers from this are single men, while the main beneficiaries are married men with a younger spouse and young children late in life. As the latter group is more affluent on average, the implied shift in resources is probably not socially desirable. Due to the increase in the female retirement age, women have “lost” their advantage in the scheme.

A stable conversion factor has its merits. Large swings in benefits, caused by fluctuations in the market interest rate, can be avoided. This does not only increase the intergenerational equity, but also limits the spill-over effects to the first pillar (via means-tested benefits). But to keep the system financially stable, the conversion factor needs to account for increases in longevity and changes in medium-run market conditions. Insurance companies, which are crucial to the well-functioning of the system, are now starting to lose interest in participating in the annuity market, given that the obligations within the mandatory part are more difficult to meet at present.

Future reforms of the BVG/LPP should aim at indexing the conversion rate to demographic parameters and long run market conditions (discounting). By this, it would contribute to the financial stability of the system and shield it more from political pressure. It also has to be discussed, whether a uniform conversion factor (and the implied redistribution) should be maintained. Contrary to conventional wisdom, women would not lose from such a change. But the occupational scheme would become more flexible and better equipped to changes in living patterns and labor market participation.

The calculation of MWRs shows that on the basis of the zero-coupon yield curve even the conversion factors used by insurance companies outside the mandatory part of the

second pillar veer on the high side for 2005. Abstracting from administrative expenses and using the risk-free rates implied by the zero-coupon yield curve on government bonds, a conversion factor of 5.53 percent would be justified for married men and a conversion factor of 5.25 percent for single women. However, this approach would imply significant fluctuations from year to year in annuity conversion factors and would expose retiring workers to considerable annuitization risk. Using a long-term rate to determine the annuity conversion factor would avoid this risk but would create other problems, such as an unintended intergenerational redistribution or potential financial stability issues for annuity providers. An alternative that would mitigate these problems would be to allow use of installment annuities. This would involve using part of accumulated capital to purchase an immediate annuity and part to purchase deferred annuities. Such an approach could also be combined with the purchase of variable annuities and use of lump sum payments.

# V. THE ORGANIZATION AND VOLUME OF SECOND PILLAR

Each employer can choose between different organizational structures. These range from setting up a completely autonomous and independent pension fund to outsourcing the scheme entirely to an insurance company. Independent pension funds and insurance companies are subject to different laws and thus different legal restrictions along several dimensions, which can be expected to have an impact on the financial structure of the pension scheme.

The second pillar is characterized by a large number of pension funds. Although their number has declined considerably over time (Table 15), there is still high fragmentation. The number of individuals covered by the pension funds is more difficult to determine as some workers/retirees participate in more than one fund (in case of multiple employers).

**Table 15 Number of Pension Funds and Members**

| | 1994 | 1996 | 1998 | 2000 | 2002 | $\Delta_{2002}^{1994}$ |
|---|---|---|---|---|---|---|
| Total Pension Funds | 12,851 | 11,572 | 10,409 | 9,096 | 8,134 | -36.71% |
| Pension Funds with members | 4,727 | 4,285 | 3,806 | 3,418 | 3,170 | -32.94% |
| Members (in m) | 3,24 | 3,15 | 3,14 | 3,23 | 3,31 | 2.22% |

Source: Bundesamt für Statistik (2004b), p.32, T8

This chapter outlines the different structures of pension funds, their characteristics, and their relative importance. It suffers from data limitations due to the large fragmentation of the second pillar and somewhat outdated standards on reporting and accounting. These shortcomings will be especially important in the section on the volume of the contributions and the accumulated old-age capital. A sizable part of the chapter is dedicated to the incidence of underfunding within occupational pension plans that has become an important policy issue since the turn of the millennium.

## 5.1 Institutions and Organization

Setting up a pension fund involves decisions on different organizational issues like the application for *registration*, the choice of its *legal* and *administrative form*, and finally, on how *risk* should be covered. This section illustrates these three issues in turn.

As mentioned in Chapter 2.2, by law the BVG insures income above the coordination offset and below a defined upper bound. In addition, pension providers can also offer insurance on a voluntary basis for income above and below the threshold levels: Most of them do it for income exceeding the upper level, but very few provide coverage for lower income levels. Companies that cover the mandatory part need to be registered. Those that only provide supplementary services do not. In 2002, 30 percent of all pension funds were

registered, i.e., they insured the mandatory part of the wage income according to Art. 48 BVG. More importantly, these funds covered 95 percent of all insured individuals. These figures have remained relatively constant over the last 8 years.

A further classification of pension funds can be made according to their legal form. One distinguishes pension funds under private law or under public law[51]. The pension funds can freely choose among the different types. Pension funds under public law often serve public employees and vice versa.[52] In 2002, 7,999 (2,806,141 members) out of total 8,134 pension funds (3,311,378 members), or equivalently 98 percent (85 percent) were under private law.[53] Even though these relations were quite stable over the last decade, there has been a shift toward pension funds under private law since 1998 due to the reorganization and privatization of state–owned enterprises.

Another classification of pension funds is based on their administrative form, represented by two main classes: A pension fund manages either the credit balances of one employer or of a group of several employers. Although about 54 percent of the pension funds are dedicated to one employer, 92.1 percent of all insured individuals belong to an institution with many affiliated employers. A comparison between 2000 and 2002 reveals that the number of single-employer institutions decreased much more than that of multi-employer ones. Within the group of institutions with many employers attached, the "Collective–Institution"[54] is the institution with the largest number of members. This administrative form allows a pooling of individual independent employers. Often an insurance company administers such institutions. Within a "collective–institution" each employer constitutes its own "pension fund entity" and negotiates its own pension plan(s).

The last classification of pension funds depends on the degree of risk coverage. This issue defines the risk exposure of the pension scheme with respect to, firstly, *longevity*, and, secondly, premature death or disability. Depending on the way a pension fund bears these risks, the following legal forms are distinguished:

1. *Autonomous pension funds without reinsurance policy:* The pension fund bears all the risks.
2. *Autonomous pension funds with reinsurance policy*: Some of the risks (e.g. potential maximum losses) are handed over to a reinsurance company.
3. *Semi-autonomous pension funds* include two cases: a) a pension fund hands over

[51] This classification is actually a relic from the period prior to the introduction of the BVG as a mandatory occupational pension agreement. The reason was the following: Before the occupational pension system was rendered mandatory, there were already many personnel-care (employee benefit) institutions (Personalfürsorgeeinrichtungen). However, the means collected by the employers to provide this voluntary service had to be strictly segregated from the rest of employer assets, i.e., they had to be transferred to an independent legal entity. Thus, the employers were allowed to either give the money to an insurance company (that operates under private law) or create a foundation or a cooperative (likewise subject to private law) or lodge the money in an institution under public law. These legal forms were eventually incorporated into the BVG.

[52] Recently, some public pension funds considered changing their legal form, as an action against funding problems. An example is the pension fund of the canton Zug.

[53] Note that almost all of these funds, i.e., over 99%, are foundations.

[54] "Collective–Institution" (Sammeleinrichtung (dt.), institution collective (fr.))

only the risk of death or disability to an insurance company and consequently still bears the risk of longevity; b) the pension fund buys the old-age pensions from the insurer too. The pension fund still manages the accumulation of retirement capital.

4. *Non-autonomous pension funds*[55]: All the risks are covered by an insurance company.
5. *Savings associations*: By construction, this form bears no actuarial risks, because only old–age savings are accumulated.

Table 16 presents an overview of the classification of pension funds. The number of non-autonomous pension funds has more than halved, but the number of individuals in such funds has remained constant. This reduction is mainly due to a decrease in the number of "Institutions of firms" (almost -40 percent since 1994) and of "Institutions for one employer". Autonomous pension funds with reinsurance contracts show an increase in both the number of funds by almost 20 percent and the number of covered individuals by more than 85 percent. They almost doubled their relative market share. This could suggest a general tendency toward handing over potential maximum losses. However, autonomous pension funds with reinsurance count less than 800 members on average. In comparison, autonomous pension funds have on average 2,500 members. This higher number allows them to bear more risk on their own.

**Table 16 Risk Coverage of Pension Funds under BVG**

| Characteristics | 1994 | % | 2002 | % | Change % | 2002 #Members/PF |
|---|---|---|---|---|---|---|
| autonomous | | | | | | |
| # Pension Funds | 663 | 14.0% | 457 | 14.4% | -31.1% | |
| # Members | 1,196,376 | 36.9% | 1,143,142 | 34.5% | -4.5% | 2,501 |
| autonomous (with reinsurance) | | | | | | |
| # Pension Funds | 488 | 10.3% | 583 | 18.4% | 19.5% | |
| # Members | 242,167 | 7.5% | 450,479 | 13.6% | 86.0% | 773 |
| Semi-autonomous | | | | | | |
| # Pension Funds | 2,120 | 44.8% | 1,404 | 44.3% | -33.8% | |
| # Members | 592,556 | 18.3% | 504,291 | 15.2% | -14.9% | 359 |
| non-autonomous | | | | | | |
| # Pension Funds | 1,300 | 27.5% | 620 | 19.6% | -52.3% | |
| # Members | 1,186,639 | 36.6% | 1,205,320 | 36.4% | 1.6% | 1,944 |
| savings association | | | | | | |
| # Pension Funds | 156 | 3.3% | 106 | 3.3% | -32.1% | |
| # Members | 21,617 | 0.7% | 8,146 | 0.2% | -62.3% | 77 |

Source: Bundesamt für Statistik (2004b), p.32, T8

Table 17 combines the two characteristics "Administrative Form" and "Degree of Risk Coverage" for the most recently available data. As Table 16 shows, the autonomous and the non–autonomous pension funds cover the largest number of individuals. Within the group of autonomous institutions, the *mixed forms* (544,841) and the *institutions of firms, holdings or parent companies* (401,738) encompass the largest number of covered

[55]Non-autonomous pension fund = Kollektive Pensionskasse (german)

individuals. Together they cover 83 percent of all the individuals insured in an autonomous pension fund. Concerning the absolute number of institutions within the group of non-autonomous institutions, the *institutions for one employer* are very prevalent with a share of 63 percent per fund, but since this administrative form only insures a modest number of individuals, its importance is limited compared to the 903,320 insured individuals in the *collective–institutions* (which equals 75 percent of total insured in non–autonomous funds). The latter group also constitutes the largest pool of members.

**Table 17 Administrative Form and Risk Coverage in 2002**

| Pension Funds | Autonomous | Autonomous (with reinsurance) | Semi-autonomous | Non-Autonomous | Savings associations | Total |
|---|---|---|---|---|---|---|
| Collective-Institution | 1% | 2% | 5% | 6% | 0% | 126 |
| # Members | 0% | 4% | 45% | 75% | 0% | 1,152,448 |
| Common-Institution | 4% | 7% | 2% | 6% | 0% | 130 |
| # Members | 8% | 45% | 27% | 16% | 0% | 615,849 |
| Mixed Form | 17% | 5% | 0% | 1% | 0% | 115 |
| # Members | 48% | 6% | 0% | 0% | 0% | 576,975 |
| Institutions of firms, holdings or mother companies | 41% | 38% | 21% | 15% | 16% | 804 |
| # Members | 35% | 27% | 13% | 5% | 42% | 659,576 |
| Institutions of another pooling reason | 6% | 8% | 11% | 8% | 10% | 288 |
| # Members | 1% | 3% | 3% | 1% | 3% | 43,923 |
| Institution for one employer | 32% | 40% | 61% | 64% | 74% | 1,707 |
| # Members | 8% | 15% | 13% | 3% | 55% | 262,607 |
| Total | 457 | 583 | 1,404 | 620 | 106 | 3,170 |
| # Members | 1,143,142 | 450,479 | 504,291 | 1,205,320 | 8,146 | 3,311,378 |

Source: Bundesamt für Statistik (2004b), p.34, T9

Table 15 has shown that the number of pension funds with active contributors has decreased by 33 percent from 1994 to 2002, indicating a consolidation and reallocation process of the whole pension fund industry. Potential explanation is a shift in the choice of administrative form and risk coverage. The only funds that increased the number of covered individuals were the autonomous funds with reinsurance and the non–autonomous funds (Table 16), i.e., both funds that hand over at least part of the risk to another party. Table 18 documents the relocation within the administrative forms. Employers have become more likely to join collective–institutions and common–institutions (often organized by professional associations). From 1994 to 2002, their respective share has increased by 15 percent and 19 percent, respectively. On the other hand, employers have become more reluctant to organize the pension fund “in–house.”

Several possible reasons explain the outsourcing of occupational old–age provision. First, outsourcing reduces the administrative efforts of employers. Second, large institutions

that are specialized in the provision of old–age insurance can handle and manage the old–age credit balances in a more professional and potentially more successful way. Third, already the choice of the administrative form often defines the degree of risk coverage by another party. Table 17 shows that 75 out of 100 collective–institutions have all their risks covered by an insurance company.

**Table 18 Shift in the Choice of Administrative Form**

| | 1994 | 2002 | Abs. change | Rel. change |
|---|---|---|---|---|
| Collective-Institution | 139 | 126 | -13 | -9% |
| # Members | 1,079,964 | 1,152,448 | 72,484 | 7% |
| # attached employer | 158,643 | 183,002 | 24,359 | 15% |
| # attached employer per PF | 1,141 | 1,452 | 311 | 27% |
| Common-Institution | 147 | 130 | -17 | -12% |
| # Members | 562,129 | 615,849 | 53,720 | 10% |
| # attached employer | 94,354 | 111,948 | 17,594 | 19% |
| # attached employer per PF | 642 | 861 | 219 | 34% |
| Institutions of firms, holdings or mother companies | 1,309 | 804 | -505 | -39% |
| # Members | 667,732 | 659,576 | -8,156 | -1% |
| # attached employer | 6,682 | 4,862 | -1,820 | -27% |
| # attached employer per PF | 5 | 6 | 1 | 18% |

Source: 1: Bundesamt für Statistik (1999), p.43
2: Bundesamt für Statistik (2004b), p.30, T7

To summarize, the dominant form of pension funds is registered and subject to private law. It manages funds in a centralized way for more than one employer. The degree of risk coverage displays a wide range of options, but there is an increasing tendency to reinsure certain risks, or to hand them over to an insurance company.

## 5.2 Contributions, Old–Age Capital and Annuities

Contributions:

Table 19 shows the contributions collected by all Swiss pension funds since 1996. In 2002, the total amount of contributions paid by employers, employees and others amounted to 31.3 billions CHF, or approximately 7 percent of Swiss GDP. Almost 50 percent went to *autonomous pension funds* and over 25 percent to *non-autonomous pension funds*. The remaining contributions were evenly distributed among the other forms. Pension funds under public law contribute 7,117 million CHF or equivalently 23 percent of the total premia volume. The fraction paid by the employers is 63.4 percent, which is higher than the average of 57 percent, indicating more rigorously sponsored pension plans at pension funds under public law. In contrast, employers affiliated to Collective– and Common–Institutions contribute around 54 percent. In total, contributions to Collective– and Common–Institutions make up 35 percent of the overall premia paid in 2002. This share can be considered as an upper bound approximation for the contributions managed by life insurance companies.[56]

[56]It is an approximation since 91% of the insured in *non-autonomous pension funds* and 72 percent of the insured in *semi-autonomous pension funds* belong to Collective– and Common–Institutions.

**Table 19 Size of Contributions**

| in m. CHF | 1996 Total | 1998 Total | 2000 Total | 2002 Total | PF under public law | Collective– and Common Instit. |
|---|---|---|---|---|---|---|
| Employees | 9,139 | 9,440 | 10,398 | 11,835 | 2,608 | 4,857 |
| Employers | 16,260 | 17,894 | 16,712 | 17,946 | 4,509 | 5,836 |
| Other Contributions | 699 | 1,325 | 1,101 | 1,549 | 0 | 138 |
| Total Contributions | 26,098 | 28,659 | 28,211 | 31,330 | 7,117 | 10,831 |
| % Employers | 62.3% | 62.4% | 59.2% | 57.3% | 63.4% | 53.9% |
| Swiss GDP (current prices) | 373,993 | 390,191 | 415,529 | 431,064 | | |
| Tot. Cont. as % of GDP | 7.0% | 7.3% | 6.8% | 7.3% | | |
| Total Members (mn) | 3.15 | 3.14 | 3.23 | 3.31 | 0.51 | 1.77 |

Source: Bundesamt für Statistik (2004a)

Old–age Credit Balances:

In 2002 accumulated balances on the notional old-age credit accounts amounted to CHF 123 billion. This represented 28 percent of the total assets of pension funds and corresponded to 29 percent of GDP. Total old-age credit balances grew by almost 8 percent per year since 2000, when they amounted to CHF 106 billion or 26 percent of that year's GDP.

Old-age credit balances represent the contributions and minimum interest income that must be credited to these accounts under the mandatory system. Since the system was introduced in 1985 and applies only to the so-called coordinated earnings of members (i.e., earnings that range approximately between 40 and 120 percent of average earnings of all Swiss workers), it is not surprising that they account for a fraction of total pension fund assets.

Currently available data do not report the amounts of contributions that are made to the mandatory part of the system, nor the payouts of accumulated mandatory balances due to retirement or death. A more complete picture will become available in 2006 following the implementation of the new reporting and accounting standards.

Annuities:

Table 20 presents several factors that describe the Swiss annuities market. Total annuity and capital payments are shown in values and as a fraction of GDP. In 2002, annuity payments were more than three times their level in 1987, i.e., two years after the introduction of the mandatory system. During the same time span, annuity payments more than doubled as a fraction of GDP, reaching 4.22 percent of GDP in 2002. The yearly increase is due to both an increase in the number of recipients and an increase in the average annuity payment. The same is true for capital (lump sum) payments. From 1987 to 2002 they rose from 0.36 to 0.82 percent of GDP. During this period, they increased as a proportion of total payments from 15 percent in 1987 to 19 percent in 2000 but then fell to 16 percent in 2002. The fall in the relative share of capital payments in 2002 is probably due to the increase in the incidence of early retirement since early retirement packages are often tied to an annuity. Figure 20 illustrates the different growth patterns for annuity and

capital payments.

**Table 20 Size of Annuity Market**

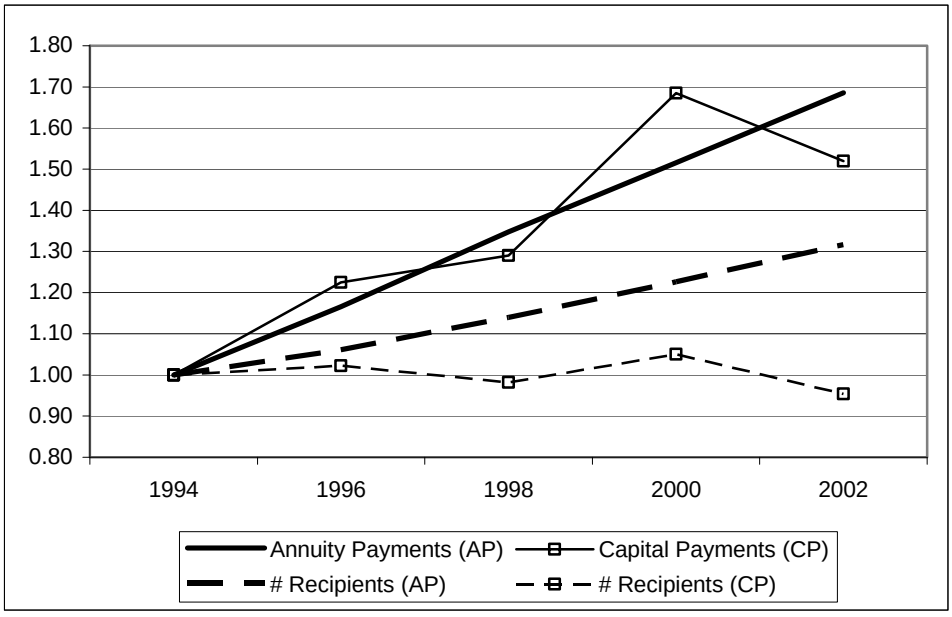
| | 1987 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 |
|---|---|---|---|---|---|---|---|
| in m. CHF | | | | | | | |
| Annuity Payments (AP) | 5,503 | 9,000 | 10,751 | 12,533 | 14,492 | 16,292 | 18,127 |
| Capital Payments (CP) | 948 | 1,830 | 2,320 | 2,842 | 2,993 | 3,910 | 3,525 |
| Total Payments | 6,451 | 10,830 | 13,071 | 15,375 | 17,485 | 20,202 | 21,652 |
| GDP (current prices) | 263,743 | 350,807 | 367,729 | 373,993 | 390,191 | 415,529 | 431,064 |
| # Recipients (AP) | | | 609,875 | 647,111 | 694,912 | 748,124 | 803,064 |
| Average Annuity (AA) | | | 17,628 | 19,368 | 20,854 | 21,777 | 22,572 |
| # Recipients (CP) | | | 29,684 | 30,342 | 29,145 | 31,164 | 28,308 |
| CP (% of AP) | 17% | 20% | 22% | 23% | 21% | 24% | 19% |
| AP (% of GDP) | 2.09% | 2.57% | 2.92% | 3.35% | 3.71% | 3.92% | 4.21% |
| CP (% of GPD) | 0.36% | 0.52% | 0.63% | 0.76% | 0.77% | 0.94% | 0.82% |

Note: Form year 1994 on, annuity payments are current payments as at 31.12

Source: Bundesamt für Statistik

Available data do not report the proportion of accumulated capital of newly retired workers (both under the mandatory and super-mandatory parts of the system) that is withdrawn as a lump sum and the part that is converted into an annuity. They also do not report the number of new retirees who convert all their accumulated capital into an annuity, those who withdraw the total capital, and those who withdraw a fraction of the available capital and convert the rest.

**Figure 21 Growth of Annuity and Capital Payments since 1994**




Source: Authors' Calculations

However, Switzerland has a very high annuitization rate within the second pillar compared to other countries despite the fact that the first pillar already offers a basic annuity stream which is close to the subsistence level. As there are no detailed representative statistics on the annuitization rate within the second pillar, we have to use proxy estimates. Using the number of new first pillar claimants and second pillar coverage rates, the number of new second pillar recipients is approximately 55 thousand each year. So departing from the 28,000 recipients of capital payments approximately 50 percent use a combination of a lump sum and an annuity. Bütler and Teppa's (2005) not representative dataset and preliminary evidence from labor force surveys also suggest that approximately 40 to 50 percent choose a (fractional) lump sum. All together approximately 20 percent of the accumulated capital is withdrawn as a lump sum for all three data sources (aggregate numbers, Bütler and Teppa (2005), and labor survey data). This fraction seems to have increased during the last decade, predominantly due to more sponsors allowing the lump sum option. Within companies that have always offered the capital option, the increase is less pronounced.

Another question is why the annuitization rate is so high. The first possible reason lies in the structure of the Swiss pension scheme with its close links between the accumulation and decumulation phases. During the accumulation phase (in which the individuals do not have any choice of provider and/or savings plan), the second pillar contributions are not only used to accumulate old age pension capital in quasi-individual accounts, but also to stock reserves to be used to cushion market fluctuations and other risks such as longevity increases of the current retirees in the scheme. At retirement the notional capital stock is translated into an annuity stream using high conversion rates mandated by law. In a way, individuals are compensated for lower accruals during the contribution period by higher annuity conversion rates when old. The second reason probably is tradition. The second pillar grew out of private occupational pension plans which predominantly offered defined benefits in the form of annuities long before the first pillar came into existence. So if people follow a habit, more people would annuitize than without such a tradition. Bütler and Teppa (2005) show, that there are large company effects even after controlling for pension plan and company characteristics, supporting the hypothesis that people follow a habit (or their peers and forerunners).

### 5.3 Assets, Liabilities and Investments

Table 21 shows the consolidated balance sheet of all pension funds since 1987. Total assets have increased by a factor of more than 2.5. Expressed as a fraction of GDP, assets have increased from 64 percent to over 100 percent. Due to unfavorable developments in the financial markets, pension wealth experienced a temporary decline after 2000. In accordance with a more favorable evolution of financial markets, the pension wealth did increase again thereafter.

The same holds true for reserves. Since 1987, accumulated reserves have increased substantially. In 2000, they amounted to over 12 percent of fixed and non-fixed capital. This is comparable to the yearly volatility of the Swiss Market Index (SMI) as a measure for market uncertainty - 15 percent in 2000.

Fixed and non–fixed capital reached the size of the Swiss GDP in 2000.[57] This position comprises present values of current annuities, contributions for income exceeding the mandatory threshold, all accruals for the risks of longevity, disability and death, some contributions that are dated before 1985, and the old-age credit balances of active contributors. (Again, due to data limitation a more complete picture will only be available in 2006.) Finally, debt capital, which more than doubled to almost CHF 17 billion over the last 15 years, mainly includes accounts payable and passive debt, as well as some passive mortgages.

**Table 21 Total Assets and Liabilities of Swiss Pension Funds**

| in M. CHF | 1987 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 |
|---|---|---|---|---|---|---|---|
| Direct Investments | 148,667 | 236,129 | 267,759 | 305,676 | 372,141 | 412,092 | 359,335 |
| Indirect Investments | 9,846 | 18,488 | 25,498 | 38,833 | 52,928 | 74,902 | 77,745 |
| Other Assets | 9,170 | 2,059 | 2,770 | 3,786 | 3,182 | 3,889 | 3,475 |
| Total Assets | 167,683 | 256,676 | 296,027 | 348,295 | 428,251 | 490,883 | 440,555 |
| Dept Capital | 7,449 | 8,953 | 10,854 | 10,821 | 14,646 | 15,861 | 16,964 |
| Funding Status and Provisions | 2,831 | 5,214 | 7,299 | 19,207 | 37,273 | 51,156 | 17,958 |
| Employer's Reserve | 0 | 0 | 6,436 | 6,682 | 8,410 | 8,788 | 8,529 |
| Fixed and Non-Fixed Capital | 157,403 | 242,513 | 271,438 | 311,585 | 367,922 | 415,078 | 397,104 |
| Total Liabilities | 167,683 | 256,680 | 296,027 | 348,295 | 428,251 | 490,883 | 440,555 |
| Ind. Inv (% of Dir Inv.) | 6.6% | 7.8% | 9.5% | 12.7% | 14.2% | 18.2% | 21.6% |
| Total Assets (% of GDP) | 63.6% | 73.2% | 80.5% | 93.1% | 109.8% | 118.1% | 102.2% |
| Fixed & Non-Fixed Cap. (% of GDP) | 59.7% | 69.1% | 73.8% | 83.3% | 94.3% | 99.9% | 92.1% |
| Provisions in % F&NF Cap. | 1.8% | 2.15% | 2.69% | 6.16% | 10.13% | 12.32% | 4.52% |

Source: Bundesamt für Statistik

Table 22 shows the investments in more detail. Total investments increased between 1996 and 2000, but decreased by over 10 percent to 437,080 million CHF in 2002, mainly due to the general decline in financial market returns. Investments in both Swiss and foreign shares, representing almost one fourth of total investment assets, decreased by more than 33 percent. Hence, it is not surprising that net investment income dropped by almost 22 percent to 11,947 million CHF during that period. On the other hand, investments in "other assets[58]" increased each year. Especially, the allocation to alternative investments has been rising. This diversification of the portfolios with alternative assets, such as hedge funds, private equity and commodities, can raise returns while diversifying and reducing overall investment risk.

Figure 22 shows the average allocation of the investments made by pension funds. Three trends (or consequences of the decline in financial market values and returns) are apparent and worth mentioning. First, the relative investments in securities that are issued by the employer (i.e., shares or other receivables) decreased sharply. Second, the proportion of bonds held by pension funds increased after 2000. Third, the relative amounts invested in shares fell to slightly below 25 percent in 2002. The latter two trends mainly reflect the

[57] Fixed capital includes savings, the capital used to cover pension liabilities plus sufficient reserves. Non-fixed capital thus is the amount exceeding fixed capital.

[58] Included in this position are accounts receivable, alternative investments, and mixed investments.

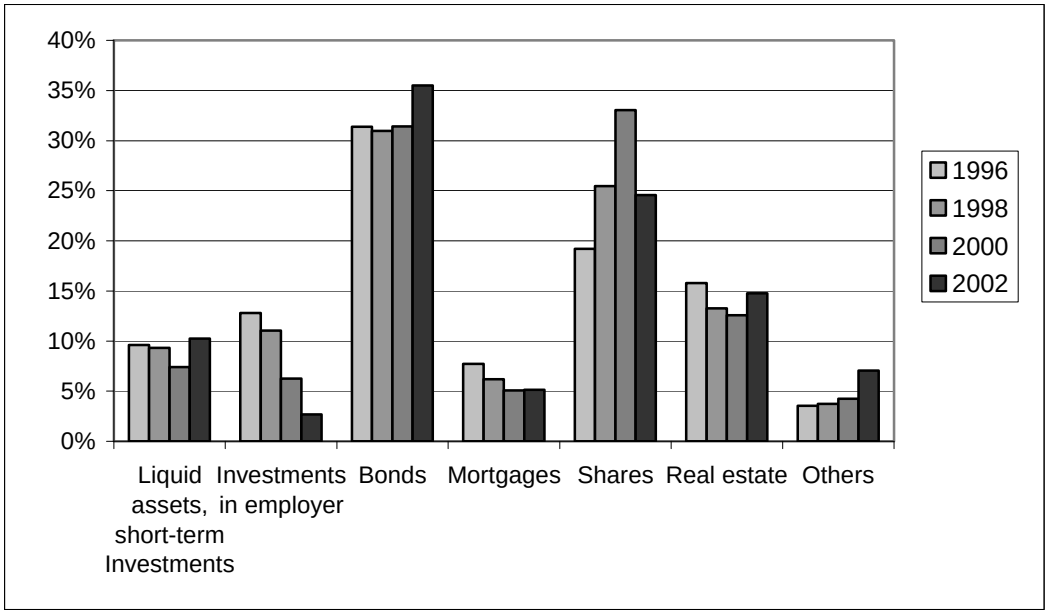
current situation in financial markets, the economic situation of the pension funds themselves, and possibly an increased risk aversion of pension fund managers.

**Table 22 Investments**

| in M. CHF | 1996 | in % | 1998 | in % | 2000 | in % | 2002 | in % |
|---|---|---|---|---|---|---|---|---|
| Liquid assets and short-term Investments | 33,045 | 9.6% | 39,614 | 9.3% | 36,051 | 7.4% | 44,821 | 10.3% |
| Investments in employer | 44,085 | 12.8% | 46,918 | 11.0% | 30,448 | 6.3% | 11,735 | 2.7% |
| Bonds | 108,084 | 31.4% | 131,720 | 31.0% | 152,936 | 31.4% | 155,193 | 35.5% |
| Mortgages | 26,552 | 7.7% | 26,338 | 6.2% | 24,731 | 5.1% | 22,486 | 5.1% |
| Shares | 66,201 | 19.2% | 108,212 | 25.5% | 160,947 | 33.0% | 107,412 | 24.6% |
| Real estate | 54,347 | 15.8% | 56,346 | 13.3% | 61,242 | 12.6% | 64,610 | 14.8% |
| Others | 12,195 | 3.5% | 15,921 | 3.7% | 20,639 | 4.2% | 30,823 | 7.1% |
| Total | 344,509 | | 425,069 | | 486,994 | | 437,080 | |
| Net Inv. Income | 14,092 | | 14,478 | | 15,234 | | 11,947 | |

Source: Bundesamt für Statistik (2004a)

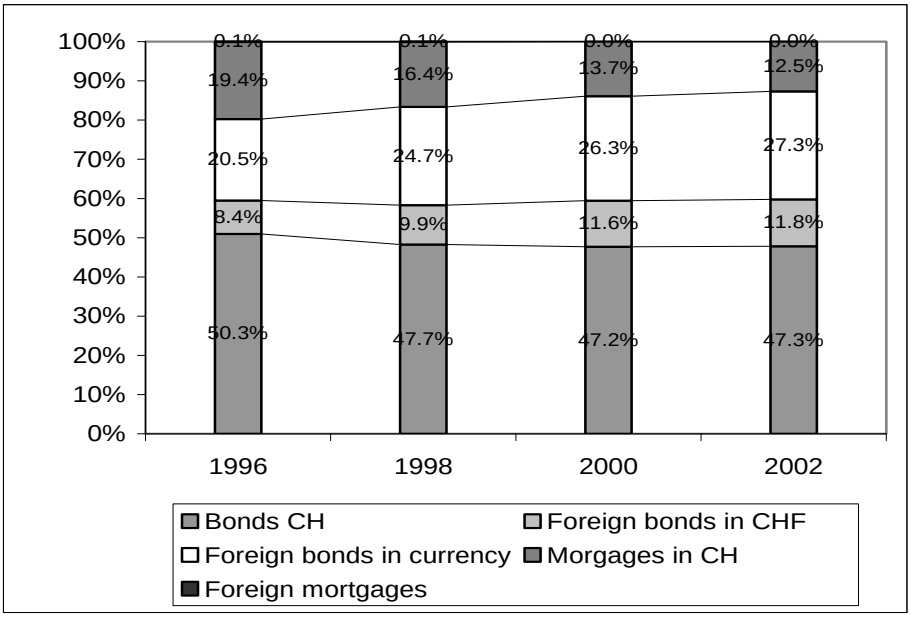
**Figure 22 Investment Positions held by Pension Funds**




Source: Bundesamt für Statistik (2004a)

Figure 23 breaks down the positions held in bonds. Bonds of Swiss debtors make up almost half of the investments in bonds. Another quarter of the investments are effected in foreign bonds in foreign currency. In 2002, foreign bonds in CHF and Swiss mortgages were equally important, although the share of mortgages has decreased, and the share of foreign bonds in CHF has increased. Mortgages in foreign properties are not important at all.

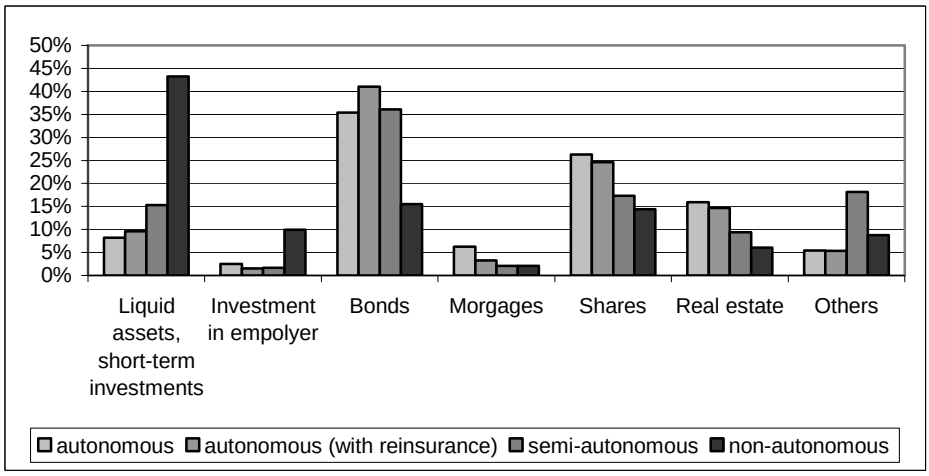
**Figure 23 Investments in Bonds**




Source: Bundesamt für Statistik (2004a)

Figure 24 shows the relative investments of pension funds with different degrees of risk coverage in 2002. Table 23 presents the total investment and the average investment per member for different forms of pension funds. It is not surprising that the *autonomous pension funds* have the largest balances. First, they insure many individuals, and second, they bear all the risks themselves. As a direct consequence, they have a huge stock of capital, both in total and per member. Apparently, the amount of capital per member decreases with the degree a pension fund hands over its risks to an insurance company. Hence, *non–autonomous pension funds* have just a tiny stock of capital left. This can be traced back to the fact that their risks are exclusively managed by an insurance company. De facto, they hand over directly most of their premiums, i.e., they merely act as intermediary between the members and the insurance company.

**Figure 24 Relative Investments and Degree of Risk Coverage in 2002**




Source: Bundesamt für Statistik (2004b), p.53 sqq., Tab. A.05

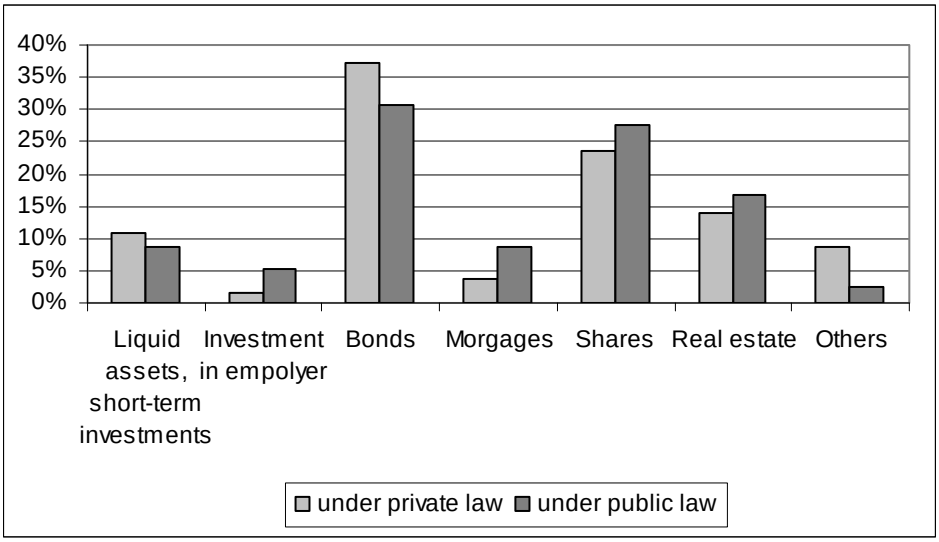
**Table 23 Investments of Pension Funds with different degrees of Risk Coverage**

| in CHF (2002) | Total Inv. (in billions) | # Members | Inv./Member |
|---|---|---|---|
| autonomous | 298,6 | 1,143,142 | 261,199 |
| autonomous (with reinsurance) | 63,3 | 450,479 | 140,606 |
| semi-autonomous | 39,8 | 504,291 | 78,861 |
| non-autonomous | 10,9 | 1,205,320 | 9,031 |

Source: Bundesamt für Statistik (2004b), p.32, T8

Finally, Figure 25 depicts the relationship between the amount invested in different assets for pension funds under private law and under public law. This figure reveals that there is no apparent difference between the investment strategy of pension funds managed under private and those managed under public law.

**Figure 25 Relative Investments of Pension Funds under private and under public Law**




Source: Bundesamt für Statistik (2004b), p.53, Tab. A.05

## 5.4 Financial Situation of Pension Funds

Extensive discussions about the financial situation of pension funds have been recurrent in recent years. The reason is threefold: Firstly, the decline in financial market returns reduced the value of investments in securities. Secondly, not all pension funds had enough reserves to balance out those fluctuations in asset values. Thirdly, the accumulated increase in life expectancy could not be fully compensated anymore by market returns exceeding the minimum interest rate specified in the law.

In 2002, nearly 20 percent of all pension funds (excluding Collective-Institutions) were underfunded. In 2003, this figure decreased to 12 percent and in 2004 even further to 10 percent. A pension fund is deemed as underfunded if its required old–age capital is more than the available capital plus reserves. This calculation is based on the report submitted by each individual fund. By law, the technical rate is fixed between 3.5 percent and 4.5 percent (Art. 8 FZV). The specific rate, however, is incumbent on the technical expert. The expert

takes into account the pension fund's specific characteristics and the long term evolution of influential (exogenous) factors.

Table 24 indicates to what extent pension funds differ in their technical interest rate. Firstly, the min/max spread ranges from 2.5 percent to 4.5 percent. Technical rates below 3.5 percent are almost never used to compute actuarial liabilities of *retirees*, but only of active contributors. Secondly, on average, the technical rate slightly decreased from 2004 to 2005. Thirdly, pension funds under public law generally use higher rates than those funds under private law. A higher technical rate generates a higher funding ratio. A 1 percent increase in the technical rate increases the funding ratio by approximately 10-15 percent by decreasing the present value of future liabilities. Note that pension funds under public law not only feature higher technical rates, but also lower funding ratios on average.

The pension funds (and thus their submitted reports) are supervised by two different agencies. Firstly, each pension fund has to choose a private supervisor as well as an expert for occupational provision (i.e., the technical expert). The former agency checks the administration of the business, its accountancy, and the investments. The latter expert audits the pension fund's ability to fulfill its obligations (at any point in time) and checks for compliance with the actuarial requirements (i.e., of both the provision of services and its funding). Secondly, each pension fund is supervised by a governmental supervisory authority. This authority, which is responsible for all pension funds in each canton, inspects, among other things, the reports of the fund's supervisor and of the technical expert.

**Table 24 Technical Interest Rates**

| | Private | | Public | | Total | |
|---|---|---|---|---|---|---|
| | 2004 | 2005 | 2004 | 2005 | 2004 | 2005 |
| Max | 4.00% | 4.00% | 4.50% | 4.50% | 4.50% | 4.50% |
| Mean | 3.85% | 3.81% | 4.07% | 4.06% | 3.90% | 3.87% |
| Min | 2.75% | 2.50% | 3.50% | 3.50% | 2.75% | 2.50% |

Source: Swisscanto (2005), p.48, Graph 2

### *5.4.1 Underfunding of Pension Funds*

The financial situation of pension funds is reviewed annually[59]. Since the review is based on balance sheet data, the reference points are 31.12.2003 and 31.12.2002, respectively[60]. The first overview of the extent of underfunding of pension funds in recent years is given in Table 25. Note that the "collective-institutions" were excluded from the analysis, and that the following numbers of pension funds with funding deficits would be greater if a lower technical discount rate had been used. Recall that a 1 percent decrease in

[59]According to Art. 44a BVV 2, the responsible agency is the Federal Office for Social Security, and the data is provided by the regulation authority.

[60]All pension funds are legally obligated to submit a detailed report on their business and their financial situation each year. If a pension fund does not submit this report, a strict procedure is enforced. Obviously, not all pension funds handed in their documents on time. Hence, the explored data represent 83.8 percent of all pension funds in 2003, and 81.1 percent of the pension funds in 2002. Still, the data is reliable, especially since subsequent statements did not change the data substantially.

the technical rate decreases the funding ratio by approximately 10-15 percent. Consequently, the amount of the funding gap would also increase. In 2003, 11.9 percent of all pension funds reported an underfunding. In 2002, this number had been considerably higher, amounting to 20 percent. This improvement can partly be explained by the recovery of financial markets, starting in April 2003. Another reason for this amelioration is selective action that had been taken to correct the funding gap.

The group of registered pension funds is split into two subgroups. The larger part consists of all *pension funds under private law* and of those pension funds under *public law without a public warranty*. In 2003, 16.4 percent of this subgroup was underfunded. In 2002, this figure was 28.7 percent. The worst situation in terms of underfunding, however, concerns pension funds under *public law with a public warranty*. This is not surprising, given the state–financed reinsurance, which covers potential financing gaps. Thus, they have a weaker incentive to prevent a funding deficit. In 2003, more than half of pension funds with a public warranty reported an underfunding.

The financial situation of pension funds from the perspective of members is as follows. In 2003, the fraction of members belonging to a pension fund (without "Collective–Institutions") with a funding deficit amounted to more than 30 percent. Even though the situation has greatly improved since 2002, where this fraction was almost 50 percent, it remains somewhat critical.

**Table 25 Extent of Underfunding[61]**

| Pension Funds | 2003 | | 2002 | |
|---|---|---|---|---|
| | With underfunding | in % | With underfunding | in % |
| Registered PF: | | | | |
| PF without public warranty | 339 | 16.40% | 604 | 28.70% |
| PF with public warranty | 45 | 54.90% | 38[62] | 49.4% |
| Total registered | 384 | 17.80% | 642 | 29.40% |
| Total PF with underfunding | 431 | 11.90% | 722 | 20.00% |

Source: 1: Bundesamt für Sozialversicherung (2004a), p.4, T2
2: Bundesamt für Sozialversicherung (2003), p.4, T2

Table 25 provided an idea of how many pension funds have a potential solvency problem. In 2003, the total amount of the funding gap comprising all the pension funds was 25,376 million CHF (16,720 m Euro or 21,884 m dollars). This corresponds to a funding gap of almost 20 percent of the total assets of underfunded pension funds or 6.3 percent of the total assets for all pension funds. The number of underfunded pension funds decreased from 2002 to 2003 and so did the size of the funding gap in absolute terms. The corresponding numbers are reported in Table 26.

[61] without "Collective-Institutions"

[62] This figure can not be compared with the one in 2003. This is due to the fact that in 2002 not all pension funds under public law with a funding gap reported their figures.

**Table 26 Money Value of Shortage**[63]

| Pension Funds | 2003 | | | 2002 | | |
|---|---|---|---|---|---|---|
| | Under-funding m CHF | % of total assets of PF with DC[64] | % of tot. assets of all PF | Under-funding m CHF | % of total assets of PF with DC | % of tot. assets of all PF |
| Registered PF: | | | | | | |
| PF, no public warranty | 8,960 | 12.00% | 2.80% | 13,278 | 11.90% | 4.40% |
| PF with public warranty | 16,343 | 31.00% | 23.30% | 29,253 | 40.30% | 36.10% |
| Total registered | 25,303 | 19.80% | 6.50% | 42,531 | 23.00% | 11.10% |
| Total all PF | 25,376 | 19.60% | 6.30% | 42,709 | 22.90% | 9.90% |

Source: 1: Bundesamt für Sozialversicherung (2004a), p.5, T3
2: Bundesamt für Sozialversicherung (2003), p.6, T3

Panel A of Table 27 shows the evolution of pension funds with underfunding in recent years. For institutions under private law, this number fell form 583 to 331 cases. The situation of pension funds under public law with a public warranty, however, is different. The number of underfunded funds within this group increased from 38 cases in 2002 to 45 cases in 2003.

Panel B presents the corresponding data for the size of the funding deficit. The number of pension funds under private law with a funding gap improved, but the percentage of the funding shortage with respect to the total assets of these pension funds remained the same. This implies that the average funding ratio increased for those pension funds affected by a shortage in 2002 (assuming that the funds that were close to a funding ratio of 100 percent could recover). For the pension funds under public law with a public warranty the number of underfunded pension funds increased, while the relative deficit with respect to total assets decreased. Nevertheless, the average situation improved considerably, as the total funding gap decreased from 42,531 million CHF to 25,303 million CHF.

**Table 27 Underfunding and Legal From**[65]

| | Panel A | | | | Panel B | | | |
|---|---|---|---|---|---|---|---|---|
| | PF with DC | | In % of total PF | | Underfunding (m CHF) | | % of total assets of PF with DC | |
| | 2003 | 2002 | 2003 | 2002 | 2003 | 2002 | 2003 | 2002 |
| PF under private law | 331 | 583 | 16.02% | 28.02% | 7,406 | 11,213 | 11.63% | 11.89% |
| PF under public law (with no public warranty) | 8 | 21 | (34.80%) | (84.00%) | 1,554 | 2,065 | 13.80% | 11.70% |
| PF under public law (with public warranty) | 45 | 38 | 54.90% | 49.40% | 16,343 | 29,253 | 31.00% | 40.30% |
| Total | 384 | 642 | 17.80% | 29.40% | 25,303 | 42,531 | 19.80% | 23.00% |

Source: 1: Bundesamt für Sozialversicherung (2004a), p.7, T6
2: Bundesamt für Sozialversicherung (2003), p.9, T7

[63] without "Collective-Institutions"
[64] DC = deficient cover
[65] without "Collective-Institutions"

### *5.4.2 Funding Ratios of Underfunded Pension Funds*

The aim of this subsection is to get an idea of the number of pension funds suffering from serious funding problems. By definition, a pension fund experiences a serious funding problem if its funding ratio, defined as the ratio between its net assets and the present value of its actuarial pension liabilities, is less than 90 percent. The funding ratio provides information about the financial ability to pay debt when it matures. In other words, it is a measure of solvency. Liquidity, in contrast, refers to the feasibility with which an asset can be converted into fungible means. The latter is also important for Swiss pension funds, for according to the law, the pension capital is fully portable. Data on pension funds were analyzed separately for all administrative forms, except collective institutions (Table 28), and for "collective-institutions" (Table 29).

Table 28 displays pension funds with a financial shortage according to their funding ratios[66]. Panel A refers to pension funds without a public warranty. In 2003, 57 pension funds (15 percent) had a funding ratio below 90 percent and thus a serious liquidity problem. The money value of their underfunding was 5,222 million CHF, which is equivalent to 21 percent of their total assets. Nevertheless, the majority of the pension funds with an underfunding had a funding gap of less than 10 percent. The situation of pension funds with a public warranty is more critical (Panel B). In 2003, the majority (29 pension funds or 65 percent) had a funding gap of more than 10 percent. These pension funds reported a deficit of 15,779 million CHF, or in relative terms, for 95 percent of the overall deficit. In terms of their total assets, the funding gap is alarming. Even though the situation of these pension funds has improved, the lack of financial resources of almost 40 percent of their total assets is still sizeable.

Table 29 presents the situation of "collective–institutions". Recall that a "collective–institution" is an aggregate of many independent employers, in which each employer is shown separately. In 2003, 7,832 employers who were attached to a "collective–institution" had an underfunded old-age credit balance. In this group, nearly 5 percent of the accounts (372) had a serious funding problem. In terms of money, their underfunding was equal to 113 million CHF, which is almost 41 percent of the overall deficit and equivalent to roughly 31 percent of their total assets. Totally, 100,262 people were threatened by a possible problem of solvency in 2003. In 2002, the situation was even worse. 151,178 insured (belonging to 9,477 different employer accounts) were affected by an underfunding. Recall from Table 17 that the total of insured individuals within the group of "collective–institutions" was almost 1.2 million, hence the fraction of affected individuals is small. In 2002, slightly more than 13 percent of the insured were affiliated to an underfunded "collective–institution". The fraction of affected employer–accounts was 5.2 percent in 2002 (9,477 out of 183,002).

[66]Funding Ratio= Deckungsgrad (german)

**Table 28 Funding Ratios**[67]

| Panel A: PF without a public warranty | | | | | | |
|---|---|---|---|---|---|---|
| Liquidity Ratio (%) | PF with DC | | Underfunding (m CHF) | | % of total assets of PF with DC | |
| | 2003 | 2002 | 2003 | 2002 | 2003 | 2002 |
| 95 – 99.9 | 221 | 272 | 666 | 1,175 | 2.80% | 3.30% |
| 90– 94.9 | 108 | 227 | 3,145 | 3,524 | 11.20% | 9.90% |
| < 90 | 57 | 185 | 5,222 | 8,757 | 21.00% | 20.60% |
| Total | 386 | 684 | 9,033 | 13456 | 11.80% | 11.80% |
| | | | | | | |
| Panel B: PF with a public warranty | | | | | | |
| Liquidity Ratio (%) | PF with DC | | underfunding (m CHF) | | % of total assets of PF with DC | |
| | 2003 | 2002 | 2003 | 2002 | 2003 | 2002 |
| 95 – 99.9 | 10 | 4 | 263 | 167 | 3.20% | 11.30% |
| 90– 94.9 | 6 | 8 | 301 | 489 | 9.20% | 7.30% |
| < 90 | 29 | 26 | 15,779 | 28,597 | 38.40% | 44.40% |
| Total | 45 | 38 | 16,343 | 29253 | 31.00% | 40.30% |

Source: 1: Bundesamt für Sozialversicherung (2004a), p.10 sqq, T 10 and T11
2: Bundesamt für Sozialversicherung (2003), p.12 sqq, T11 and T12

**Table 29 Funding Ratios of Employer–Accounts in "Collective–Institutions"**

| Liquidity Ratio (%) | Accounts in "Collective-Institutions" with DC | | # of policy holders | |
|---|---|---|---|---|
| | 2003 | 2002 | 2003 | 2002 |
| 95 – 99.9 | 7051 | 5278 | 75,388 | 75,229 |
| 90– 94.9 | 409 | 4199 | 12,322 | 75,949 |
| < 90 | 372 | | 12,552 | |
| Total | 7832 | 9477 | 100,262 | 151,178 |
| Liquidity Ratio (%) | underfunding (m CHF) | | % of total assets of PF with DC | |
| | 2003 | 2002 | 2003 | 2002 |
| 95 – 99.9 | 96 | 127 | 2.07% | 2.56% |
| 90– 94.9 | 69 | 513 | 15.16% | 11.86% |
| < 90 | 113 | | 30.71% | |
| Total | 278 | 640 | 5.09% | 6.89% |

Source: 1: Bundesamt für Sozialversicherung (2004a), p.17 sqq, T21 and T22
2: Bundesamt für Sozialversicherung (2003), p.19 sqq, T22 and T23

### *5.4.3 Causes for the Underfunding*

Table 30 summarizes the main reasons that were responsible for the funding deficits. Note that theses reasons have been self-reported by the pension funds. Losses on securities were the main trigger for nearly 60 percent of the pension funds. In 2003 and for pension funds except "collective–institutions" (Panel A), an insufficient actuarial funding caused a funding shortage in 22 percent of the cases. In 2002, insufficient returns on investments were also often the reason for such a situation.

[67] without "Collective-Institutions"

**Table 30 Causes for an Underfunding (self-reported)**

| Cause | Panel A PF (in %) | | Panel B Collective–Inst. (in %) | |
|---|---|---|---|---|
| | 2003 | 2002 | 2003 | 2002 |
| Losses on Securities | 59% | 50% | 59% | 46% |
| Insufficient Returns on Investments | 4% | 30% | 22% | 20% |
| Insufficient Actuarial Funding | 22% | 9% | 4% | 5% |
| Losses on Other Investments | 9% | 4% | 4% | 26% |
| Other | 6% | 8% | 11% | 3% |
| Total | 100% | 100% | 100% | 100% |

Source: 1: Bundesamt für Sozialversicherung (2004a), p.20, T25 and T26
2: Bundesamt für Sozialversicherung (2003), p.22 sqq., T26 and T27

The same causes also apply to "collective–institutions" (c.f. Panel B). Nevertheless, this administrative form needs a closer examination. Table 17 shows that 113 "collective–institutions" out of 126 ($\approx 90\%$) hand over their risks inherent in old age provision (at least part of them) to a life insurance company. As mentioned before, insurance companies are basically not allowed to have any funding shortage. Thus, how can the figures in Table 29 be explained? For the few "collective–institutions" that handle their risks autonomously, the same reasons as above apply. However, for the *semi– and non–autonomous institutions*, three more reasons have to be considered:

1. Since *semi–autonomous institutions* manage at least the accumulation of retirement capital themselves, they are subject to market risks.
2. In the case of *non–autonomous institutions*, all risks are covered by an insurer. Nevertheless, some non–autonomous "collective–institutions" may offer "separate investment accounts" to their affiliated employers. As a direct consequence of these "separate investment accounts", employers bear part of the investment risks.
3. The insurance company may refuse to guarantee the minimum interest requirement.

### *5.4.4 Measures to Correct the Funding Gap*

This subsection discusses some measures that have been taken to remedy the financial situation of pension funds.[68] To show the variability of actions across different pension funds and years, "collective institutions" are discussed separately, and two successive years are explored.

[68] Note that these measures have been reported by the pension funds.

In 2003, the most popular measures (taken by pension funds that are not "collective–institutions") were additional contributions of employers (26 percent), cutbacks of benefits (20 percent) and reductions in the interest rate paid on accumulated old-age credit balances (16 percent)[69]. All of these measures are easier if the proportion of retirees is low. If retirees constitute a large fraction within the group of insured individuals, the recapitalization is more difficult. In such a case, either a cutback of current benefits is possible, or the pension fund relies on an increase in financial market returns. However, the former action was quite rare (7 percent in 2003).

In 2002, the most common instrument to correct the underfunding was the reduction in the interest rate on the accumulated pension capital (36 percent). Consequently, it was either reduced (22 percent) or even set to zero (14 percent). Another frequent measure was additional contributions of employees. The last common action refers to the investment strategy. In 7 percent of all the actions, the strategy was adjusted and in 10 percent it was maintained. The reason for the latter decision on the investment strategy is the belief that in the long run the underfunding will be eliminated by the performance of the portfolio.

In 2003, the measures taken by "collective–institutions" were the maintenance of the previous investment strategy (16 percent) and/or the improvement of the present risk management (16 percent). The actions listed above in the first place, i.e., cutting back the provisions and lowering the interest rate were only of minor importance. While pension funds (except for "collective–institutions") used capital contributions of employers (16 percent) as their primary instrument, the "collective–institutions" did not use this method.

To sum up this last section, a broad range of measures have been taken in order to remedy the financial situation of pension funds. However, demanding additional contributions of employers, lowering the interest rate and cutting back the performance were the most frequent measures. The "Collective–institutions" on the other hand, focused more on their investment strategies and on the improvement of their risk management.

[69] Example: A pension fund lowers the interest rate on accumulated old-age credit balances by 0.5 percent for one year. The implied costs for contributors can be expressed as a fraction of the coordinated salary or of the accumulated old age savings at retirement (reduction in future benefits):

| Age | 30 | 40 | 50 | 60 |
|---|---|---|---|---|
| As a fraction of salary (in %) | 0.2 | 0.7 | 1.6 | 2.9 |
| Reduction in projected pensions (in %) | 0.006 | 0.17 | 0.3 | 0.45 |

# VI. THE THIRD PILLAR

## 6.1 Introduction

The third pillar in the Swiss old-age insurance system comprises additional savings directed at providing income in old age. Its main goal is to fill potential gaps in the provision of old-age income. In view of the high replacement rates offered by the first and second pillar for individuals with an uninterrupted work history, the additional insurance is primarily important for the self-employed (who are not covered by the second pillar) and people with contribution gaps (foreign workers, career breaks, etc). Up to a certain amount (i.e., contributions within the limits of the so-called pillar 3a), third pillar savings are fully tax deductible. Thus, pillar 3a has also become a popular instrument to save taxes.

It is very difficult to get reliable data on the volume of the third pillar as related retirement savings are provided not only by insurance companies, but also by most banks and other financial intermediaries. This caveat is probably of lesser importance for the scope of this paper as only a tiny fraction of the accumulated third pillar capital is annuitized.

The low level of annuitization is not surprising given the predominance of annuities in the first and second pillars. Individuals with a higher demand for an annuity are much more likely to explore the option to increase the tax-favored contributions to the more generous second pillar.[70] Moreover, very few of the third pillar annuity contracts are standard annuity contracts that would allow a comparison of returns across companies and over time.

## 6.2 Overview

The privately organized third pillar is characterized by a broad scope of design. Thus, it is not only focused on providing old-age insurance. Other solutions provided within the third pillar are *Securities in case of death, Saving* and *Securities in case of occupational disability*. Consequently, the products offered by life insurance companies or banks differ in terms and characteristics.

An overview with respect to the different characteristics of insurance and bank products is given in Table 31. Precautionary capital is either classified as conditional (called 3a) or unconditional (called 3b). The key distinguishing features of each form are listed in Table 32.[71] The most important characteristic of pillar 3a is that its contributions are tax deductible within the limits specified in the law.

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[70] The law limits additional tax-exempt contributions to the second pillar. However these restrictions hardly bind for individuals that would otherwise contribute to the third pillar. Shortages of retirement capital due to divorce, career interruptions and migration in and out of Switzerland can be fully replaced.

[71] The term “conditional” originates from the fact that this capital is exclusively used in the form of old-age provisions.

**Table 31 Differences of Insurance and Bank Products**

| Characteristics | Insurance Company | Bank |
|---|---|---|
| Conditional (Pillar 3a) | Saving Risk-Coverage | only Saving |
| Unconditional (Pillar 3b) | Saving Risk-Coverage | Saving Investment |

Source: Allianz Suisse

**Table 32 Differences of conditional and unconditional precautionary capital**

| Differences | 3a | 3b |
|---|---|---|
| Individuals | Employed and aged below the AHV-age and having a Swiss Tax-Domicile | all |
| Products | limited | unlimited |
| Maturity | Limited to AHV-age, but it cannot be paid out earlier than 5 years before the AHV-age | no limitations |
| Contributions | Limited to the maximum amount that is tax deductible: with a 2nd pillar: 6,192 CHF without a 2nd pillar: 30,960 or 20% of total earned income | no limitations |
| Beneficiary in case of death | specified by law | free |
| Repurchase | under certain conditions | possible |
| Pledging | possible for the use of own real estate | possible for every reason |
| Tax deductible contributions | Premiums can be fully deducted from taxable income | Lump–sum deduction possible |
| Taxation during the contract period | None | Repurchase Value and Profit Shares |
| Taxation at the redemption | Taxation as income applying a reduced rate | No taxation of insurances that are based on premiums |

Source: Allianz Suisse

The basic third pillar instruments offered by life insurance companies are listed below. Only products that contribute in some aspects to old-age insurance are mentioned. Thus the detailed terms are negotiated bilaterally.

- *Private Annuity*: A private annuity provides a lifelong annuity. Some features can be added to the standard case. Hence, it is possible to include the spouse as beneficiary or to agree that the outstanding balance is repaid to the spouse in case the main beneficiary dies.
- *Endowment Insurance*: This contract provides insurance in case of death. Otherwise

it constitutes a saving account. Both in the event of death and in the event of living the beneficiary is entitled to a provision.

- *Variable Annuity*: In addition to the mixed Life–Assurance, there is an explicit participation in the development of financial markets. The corresponding funds are chosen according to the risk profile and the investment horizon of the policy holder.
- *Saving Accounts*

All products can be financed either by regular premiums/contributions (annually, quarterly or monthly) or by a lump–sum transfer. Apart from their main purpose as a specific investment instrument (mainly 3b products), third pillar assets are also widely accepted as a collateral for credits.

## 6.3 Volume of the Third Pillar (Life Insurance Companies)

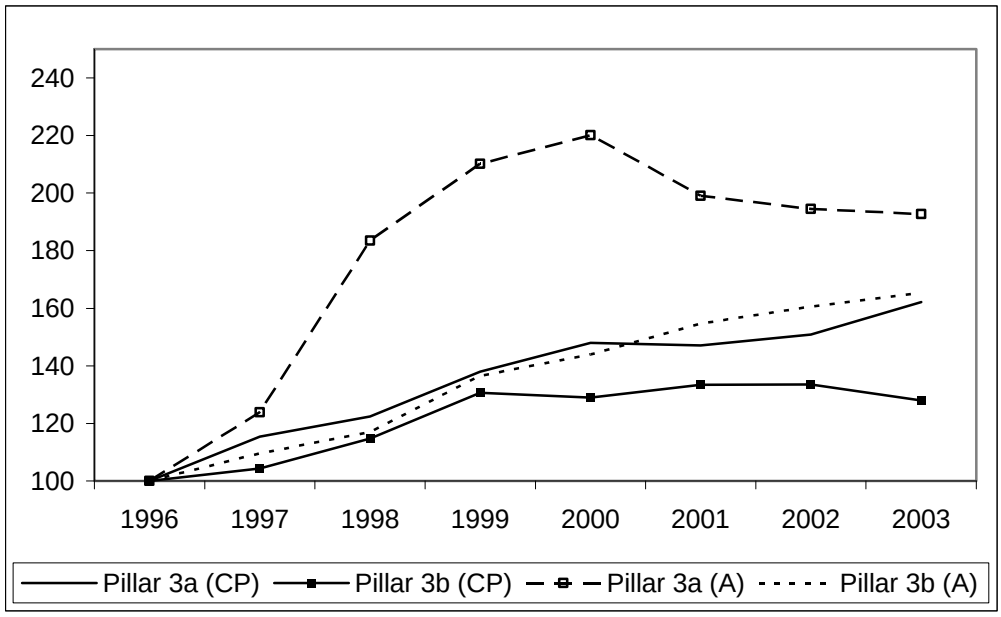
Table 33 shows the evolution of capital accumulated in the third pillar by insurance companies. In 2003, 244 billion CHF were invested in the form of capital insurance, i.e., a product that yields a capital payment (CP) at a later date (around the statutory retirement age). Thereof, 35 percent is conditional precautionary capital. The remaining 65 percent are invested in pillar 3b and are therefore unconstrained in their purpose. The total investments in annuity products (A) amount to only 2 billion CHF. Compared to the investments resulting in a lump sum, the total of 2 billion does not even account for 1 percent of this amount. Both types of products have shifted from pillar 3b to pillar 3a over the last years (see Figure 26): annuities, especially during the 1990s, and capital payments, during the last years. As mentioned above, the low degree of annuitization in the third pillar reflects the fact that annuities are still the dominant pay-out option of the first two pillars.

**Table 33 Evolution of Capital Invested in the Third Pillar**

| Balances | 1996 | | 1997 | | 1998 | | 1999 | |
|---|---|---|---|---|---|---|---|---|
| | CHF mn. | % | CHF mn | % | CHF mn | % | CHF mn | % |
| Capital-Payments | | | | | | | | |
| Pillar 3a (CP) | 52,680 | 29.89% | 60,829 | 32.07% | 64,503 | 31.27% | 72,694 | 31.05% |
| Pillar 3b (CP) | 123,549 | 70.11% | 128,858 | 67.93% | 141,806 | 68.73% | 161,459 | 68.95% |
| Total (CP) | 176,229 | 100% | 189,687 | 100% | 206,309 | 100% | 234,153 | 100% |
| Annuities | | | | | | | | |
| Pillar 3a (A) | 109 | 9.40% | 135 | 10.49% | 200 | 14.01% | 229 | 13.78% |
| Pillar 3b (A) | 1,050 | 90.60% | 1,152 | 89.51% | 1,228 | 85.99% | 1,433 | 86.22% |
| Total (A) | 1,159 | 100% | 1,287 | 100% | 1,428 | 100% | 1,662 | 100% |
| | 2000 | | 2001 | | 2002 | | 2003 | |
| | CHF mn | % | CHF mn | % | CHF mn | % | CHF mn | % |
| Capital-Payments | | | | | | | | |
| Pillar 3a (CP) | 77,954 | 32.84% | 77,489 | 31.99% | 79,448 | 32.50% | 85,429 | 35.08% |
| Pillar 3b (CP) | 159,388 | 67.16% | 164,772 | 68.01% | 164,970 | 67.50% | 158,100 | 64.92% |
| Total (CP) | 237,342 | 100% | 242,261 | 100% | 244,418 | 100% | 243,529 | 100% |
| Annuities | | | | | | | | |
| Pillar 3a (A) | 240 | 13.70% | 217 | 11.79% | 212 | 11.16% | 210 | 10.79% |
| Pillar 3b (A) | 1,512 | 86.30% | 1,624 | 88.21% | 1,687 | 88.84% | 1,737 | 89.21% |
| Total (A) | 1,752 | 100% | 1,841 | 100% | 1,899 | 100% | 1,947 | 100% |

Source: Bundesamt für Privatversicherungen (2003), p.66 sqq.

**Figure 26 Growth of Different Segments of the Third Pillar**




Source: Bundesamt für Privatversicherungen (2003)

Seventy-five percent of the accumulated pillar 3a capital in insurance companies is invested in one of the top five players, i.e., *Basler Life, Generali Person, Rentenanstalt (Swiss Life), Winterthur Life* and *Zürich Life*. Within this group, *Rentenanstalt (Swiss Life)* is the leader, with a share of almost 22 percent of the total capital. The remaining 25 percent is distributed among many different insurance companies. Note that even some foreign companies, such as *Império*, are active in this part of the Swiss pension system. The situation with respect to pillar 3b is similar. The same few companies cover the majority of the invested capital. Nevertheless, with *Patria* and *Providentia* there are two additional players in that market that have no weight in the market of pillar 3a.

## 6.4 Volume of the Third Pillar (Banks)

Table 34 presents the conditional precautionary capital (i.e., pillar 3a with capital payments[72]) managed by banks. In 2004, the total amount reached almost 24 billion CHF. This corresponds to an increase of 46 percent, compared to the 16.4 billion CHF in 2000. Prior to this date the investment remained almost constant around 17 billion CHF (c.f. also Figure 27). In 1997, the money allocated to banks represented 29 percent of the amount at life insurance companies (IC). The different growth patterns of banks and insurance companies can be seen in Figure 27.

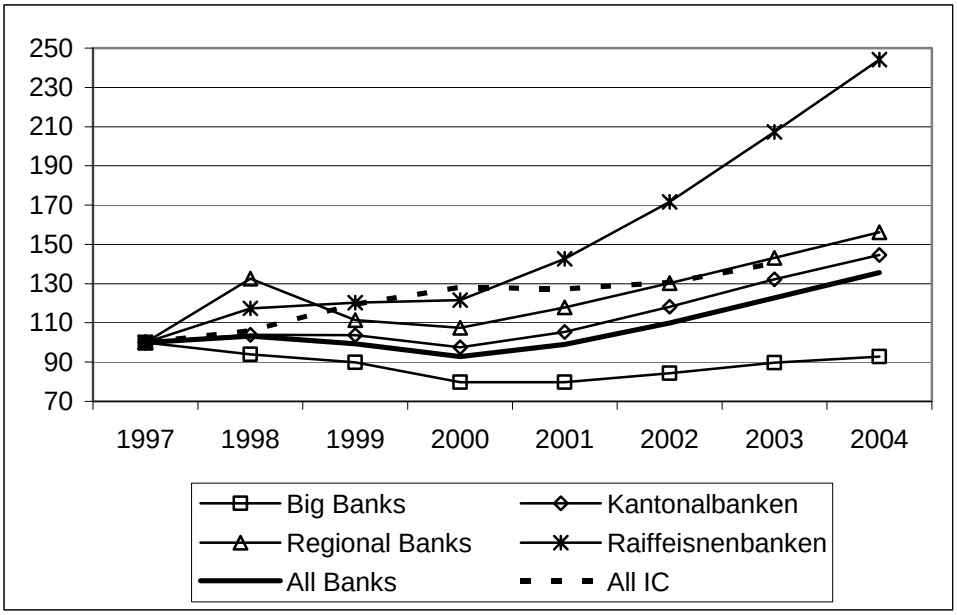
[72]Some banks also offer annuities, but on behalf of life insurance companies. Thus, these annuities appear in the balances of the insurance company.

**Table 34 3a Capital managed by Banks**

| Total 3a (m CHF) | Big Banks | Kantonalbanken | Regional Banks | Raiffeisenbanken | Other Banks | All Banks |
|---|---|---|---|---|---|---|
| # of banks | 3 | 24 | 83 | 1 | 227 | 338 |
| Year–end values | | | | | | |
| 1997 | 7,929 | 5,614 | 1,812 | 1,460 | 866 | 17,681 |
| 1997 in % | 45% | 32% | 10% | 8% | 5% | 100% |
| 1998 | 7,452 | 5,836 | 2,402 | 1,715 | 834 | 18,239 |
| 1999 | 7,122 | 5,822 | 2,018 | 1,758 | 836 | 17,556 |
| 2000 | 6,321 | 5,475 | 1,946 | 1,777 | 877 | 16,396 |
| 2001 | 6,323 | 5,916 | 2,137 | 2,082 | 1,041 | 17,499 |
| 2002 | 6,692 | 6,638 | 2,360 | 2,506 | 1,239 | 19,435 |
| 2003 | 7,108 | 7,422 | 2,595 | 3,026 | 1,553 | 21,703 |
| 2004 | 7,357 | 8,116 | 2,830 | 3,563 | 2,110 | 23,976 |
| 2004 in % | 31% | 34% | 12% | 15% | 9% | 100% |
| Total increase | -7.21% | 44.56% | 56.16% | 144.06% | 143.64% | 35.60% |

Source: Schweizerische Nationalbank (2005), p.A72 sqq.

**Figure 27 Growth of the 3a Capital at Different Banks**




Source: Schweizerische Nationalbank (2005), p.A72 sqq.

Table 34 also presents the allocation of the 3a–capital relative to the different types of banks in Switzerland. In 2003, the big banks (UBS, Credit Suisse and Credit Suisse First Boston) and the different "Kantonalbanken[73]" each controlled one third of the total 3a–capital. The "Raiffeisenbanken" with a 15 percent market share and the different regional banks with a 12 percent market share are the other important players in this business. The remaining fraction of 9 percent is allocated to all other banks (as e.g. commercial banks, private banks, and foreign banks) operating in Switzerland. In 1997, the market of conditional precautionary capital was more concentrated, i.e., the big banks controlled 45 percent of the market and the "Kantonalbanken" 32 percent. The "winner" over the last 7

[73]In Switzerland, each canton (except Solothurn) has its own Kantonalbank (cantonal bank). Most of them are administrated under public law and enjoy public warranty.

years were the “Raiffeisenbanken”. They increased their 3a–capital stock by 144 percent and they almost doubled their market share. The fact that the last three annual growth rates were over 10 percent mirrors the increasing awareness of the importance of retirement arrangement beyond the first and second pillar.

## 6.5 Summary

The third pillar is supposed to finance potential gaps in old–age insurance, especially for self-employed individuals and those with interrupted work histories. However, its alternative use as a tax-favored investment device has now become the more important goal for well-insured middle and high income individuals. The products offered by life insurance companies and banks range from saving accounts to products that also cover some specific risks. In 2003, the capital invested in lump-sum contracts offered by insurance companies, which constitutes the most important savings instrument, amounted to 244 billions CHF. Annuity contracts are very rare. The bulk of the invested third pillar capital is found in a few leading life insurance companies. The capital invested in conditional savings accounts (i.e., pillar 3a) at banks represented 24 billions CHF in 2004. Two thirds are managed by the big banks and the “Kantonalbanken”.

# VII. MAJOR RISKS AND RISK MANAGEMENT IN THE SECOND PILLAR

## 7.1 Introduction

The major risks faced by the different parties in the second pillar parallel those in other countries.[74] The usual suspects are market (return) risks, longevity, inflation, and, as a consequence of all of these, the potential bankruptcy of a pension provider. By fixing the annuity conversion factor, the second pillar legislation puts a large weight on reducing the risk for individuals close to retirement. Moreover, people already retired are protected from a potential bankruptcy of the plan sponsor within the mandatory part of the scheme, but not from inflation.

As outlined in previous chapters, Switzerland has extensive legislation concerning the design and operation of pension plans. However, it has relatively few constraints on how the pension funds should deal with risk. In particular, asset and liability management is left to the discretion of the pension fund. Given the large fragmentation of the second pillar, it is also very difficult to obtain representative data as to how the pension funds deal with these issues. Personal conversations with fund managers and actuaries show a huge variation of strategies that cannot easily be summarized.

This section first reviews the major risks faced by the different players. The second part focuses on the risk management of pension providers. Due to data limitations, this information will not be representative of the asset and liability management strategies of Swiss pension funds. The Appendix provides some case studies from a selection of pension funds. Again, these examples can be expected to have a clear bias toward sound and successful practices of financially healthy pension funds or insurance companies, as these are much more likely to disclose their strategies.

## 7.2 Major Risks Faced by Involved Parties

### *7.2.1 Workers*

- *Changes in the BVG legislation* usually do not (much) affect people less than 5 years prior to retirement. For all others, changes in the annuity conversion factor (implied by increases in longevity and decreases in market returns) can substantially reduce anticipated benefits.
- *Market returns* affect the level of retirement capital directly (via the minimum interest rate and the investment performance of the plan sponsor) and indirectly (via the conversion factors). Short run fluctuations of market returns around a constant level do not constitute a risk for workers as annuities are not priced in the market, the annuity rate risk is thus very small.
- *Bankruptcy of the pension fund* constitutes a potential risk for (accumulated)

[74] Bohn (2005) discusses the impact of alternative tax, pension, and health care policies on different cohorts. The motivation is that traditional retirement programs largely exempt retirees from sharing risk and that consequently a more than proportional risk is imposed on the younger cohorts and future generations.

contributions that exceed 150 percent of the coordinated salary, as the Guarantee Fund does not insure this part.

### *7.2.2 Pensioners*

Pensioners face the following risks:

- *Purchasing power risk* as pension providers only have to adjust the benefits to changes in the CPI if the financial situation of the fund allows it.
- *Bankruptcy of the pension fund* constitutes a potential risk for the benefits exceeding the level implied by 150 percent of the coordinated salary, as the Guarantee Fund does not insure this part.
- A *longevity* risk for those choosing the *lump-sum*. The risk of running out of assets too early is especially high if the regular first pillar benefits are low due to an interrupted work career. As all pensioners have access to means-tested supplementary benefits of the first pillar, this risk is somewhat limited, but it may still imply that the pensioner cannot keep the pre-retirement living standard.

### *7.2.3 Pension Providers*

The risks faced by pension funds do not differ from those faced by annuity providers in other countries with one big exception: The provider has little choice in setting the terms of the annuity contract due to the fixed conversion factors. If the conversion factor does not correspond correctly to estimated mortality tables and market returns, the provider faces a considerable shortfall risk.

Another feature to which pension funds are exposed is the fact that the old–age credit balances are accumulated and decumulated in the same pension fund. This is in contrast to the Chilean system, where workers can choose freely among different pension funds (accumulation phase). Thereafter, they purchase an annuity from an insurance company or a withdrawal from a pension fund (decumulation phase). Thus, the asset side and the liability side exhibit different characteristics in these two models (e.g. duration).

### *7.2.4 Government*

The government faces two main risks:

- Different layers of government (federal and cantonal) often have to guarantee the promised benefits and other contractual agreements of affiliated pension funds under public law with a warranty. As it has been previously demonstrated, many of these (large) funds suffer from significant funding deficits and, therefore, constitute a threat to state finances.[75]
- The risk of a large number of bankruptcies that might threaten the viability of the

[75]As per 31.12.2004, the Swiss Government payed 34 billions CHF into the accounts of pension funds under public law. This amount equals 7.7% of the Swiss GDP in 2004 or equivalently 26.7 percent of Government debts in 2004.

Guarantee Fund. As the latter is financed on a pay-as-you-go basis without capital reserves, a large number of failures are likely to trigger a very high contribution rate for healthier funds, which in turn may drive more of these into financial difficulty. The financing structure of the Guarantee Fund (which should be operated as a re-insurer in the pension business) has thus a built-in amplifier in case of crises.

It is hardly imaginable that the government would not intervene in such a situation as the pensions and old-age credits guaranteed by the fund are mandated by law.

The *bailing-out* risk is directly related to the regulation of the pension fund itself. The more the minimum interest rate requirements and the conversion factors deviate from the value dictated by medium-run market conditions and demographics, respectively, the higher is the risk of bankruptcy for an individual pension fund.

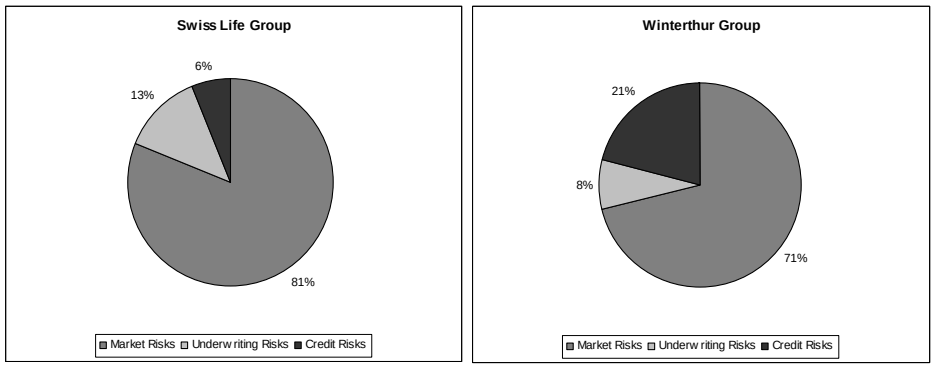
### 7.3 Risk Management in the Second Pillar

The major risks faced by pension funds are market and longevity risks. Figure 28 depicts the distribution of risks[76] for the two (life) insurance companies *Swiss Life Group* and *Winterthur Group*. For both companies, the market risks are among the largest quantifiable risks. In the case of the Swiss Life Group they amount to over 81 percent of all quantified risks. The underwriting risks, which are defined (in a pure life insurance company) as the risk of longevity, death, and disability (13 percent) and the credit risks (6 percent) complete the risk exposure of Swiss Life Group. At Winterthur Group these latter two risk categories constitute a larger fraction of the quantified risks. Thus, the risk exposures of Winterthur and Swiss Life differ and so does their risk management.

Risk management *identifies*, *evaluates* and *manages* these different types of risk and ensures that the respective pension fund is able to meet its (long–term) obligations. The concrete strategies and techniques depend on the internal capacities of the pension fund, on the skills of its risk manager, on the availability and affordability of financial instruments (e.g., hedging with derivatives is costly, thus it may not be affordable nor appropriate for a small autonomous pension fund), and finally on the constraints imposed by regulation.

[76]Note: The underlying figures refer to the whole business of the respective company. Nevertheless, they allow the reader to have an idea about the size of the different risk categories. Given that the risks in the general/main business of life insurance companies are similar to the risks in old–age provision, the figures approximate the situation of pension funds. This is particulary true for the figures of the Swiss Life Group, since the underlying activities of the Winterthur Group also includes a Non–Life part.

**Figure 28 Distribution of Risks by Category**




Source: Swiss Life (2004), p.59 and Winterthur (2004), p.63

Winterthur Group for instance, evaluates risks and its capital requirements by the measurement method of *Economic Risk Capital (ERC)*. This method measures all risks on the basis of their potential economic loss, irrespective of how they are handled. Thereby it distinguishes between (c.f. also Figure 28):

- *Market Risks*: Market risks cover adverse changes in interest rates, foreign exchange, equity prices, private equity, and real estate values. ERC calculates for each risk type separate figures, which are measured on a 99 percent confidence level and for a 1-year holding period. Assets and liabilities are marked to market, where the cash flows of the liabilities are determined by actuarial projection methods. Equity prices, interest and foreign exchange rates are calculated by applying historical simulations. Numbers related to the real estate ERC are obtained by using a variance–covariance approach. It uses historical country-specific data, i.e., real estate indices.
- *Credit Risks*: Expected losses in the portfolio are calculated by the use of ratings. A component that captures the possible change in the rating of the underlying assets as well as a spread risk component on traded positions are included.
- *Underwriting Risks*: Central reference figures from ALM (asset and liability management) are used to calculate the required ERC from unplanned risk accumulations, such as deviations from expected mortality, disability, longevity, and expected surrender rates (in the life and pension business part).
- *Business Risks*: In general, the risks that the ongoing income from the business is not able to cover the ongoing expenses subsequent to a severe crisis.
- *Operational Risks*: Operational risks result either from inadequate or failed internal processes, systems or employees or from external events like e.g., fraud or system breakdowns.

The method ensures that Winterthur Group remains able to pay its liabilities up to a specific prescribed level of solvency, even in the case of extraordinary market, business and operational situations. Since ERC is the common denominator for all risks it strengthens the ability to monitor and control them. Furthermore, it contributes to greater risk transparency and it facilitates the analysis of risk management issues within the Group.

### *7.3.1 Risk Management Strategies: Market Risks*

On the asset side of the balance sheet, market risks refer to fluctuations in the value of securities (e.g. stocks, bonds, real estate) as well as to changes in foreign exchange rates. On the liability side, the risk stems form the guaranteed minimum interest rate. To mitigate these risks and to additionally achieve an adequate investment performance, suitable investment strategies and derivatives are used. The following listing presents designated hedging instruments:

- Interest Rate Derivatives
- Interest Rate Swaps
- Currency Derivatives
- Currency Forward Contracts
- Equity Derivatives

As the most hedging strategies use derivatives, having access to a fully developed capital market is necessary to manage market risks efficiently. This condition is obviously satisfied for Switzerland.

### *7.3.2 Risk Management Strategies: Longevity Risk*

Pension funds have little scope to set the terms of the annuity contracts in the mandatory part of the system. (They are free to set annuity conditions in the non-mandatory part.) The risks related to the fixed conversion factor are incorrect assumptions about mortality and market returns. These risks can be substantial. If the conversion factor is set too high, it will be difficult to meet the obligations mandated by the law. This has important implications for the asset and liability management of a fund. High conversion factors may induce funds to choose investment strategies with a high expected return and thus more risk to compensate for this.

Almost all pension funds base their estimates on mortality tables provided by the Federal Insurance Fund (FIF), with possible adjustments based on past experience. Note that due to a relatively high degree of homogeneity among the annuitants of a given pension fund (construction workers, teachers, bank employees), the average life expectancy may well differ from the population average.

The implied sorting in the second pillar facilitates tailor-made adjustments of the benefit structure. A recent example in Switzerland is provided by the generous early retirement schemes for construction workers that can be financed to a large extent by a well below average life expectancy. As mortality rates are negatively correlated with lifetime income, the sorting of annuitants prevents extensive redistribution from the short-lived poor annuitants to the long-lived richer annuitants.

Most pension funds do not update their mortality rates on a yearly basis. Often liabilities are computed using the published FIF mortality rates and then augmented by 0.4

percent to 0.5 percent every year, until the new FIF mortality rates become available, i.e., every 10 years. The 0.4 percent per year adjustment causes an increase in longevity over 10 years that coincides almost exactly to the rise in longevity using the SFSO or FIF improvement rates for all groups of annuitants. Thus it constitutes a good approximation for the anticipated increase in longevity. The 0.5 percent per year adjustment is a more prudent estimate. When the new mortality tables become available, the pension funds adjust their longevity reserves that had been accumulated over the previous 10 years.

### *7.3.3 Asset and Liability Management*

In the 1990s, the chief tasks of asset and liability management (ALM) were rather eclipsed. The high returns rendered an appropriate matching of assets and liabilities unnecessary, especially, since existing reserves were considered as more than adequate. During the last years, unfavorable developments in financial markets scaled back the pension funds ability to take risks. As a direct consequence, many pension funds ran into a funding deficit. This situation triggered a regulatory reaction that involved the imposition of a new risk definition. This new definition stresses the fulfillment of the obligations, i.e., provision for old age, as the main goal. The old version was more focused on the adherence to the minimum interest requirement. Thus, the new version pursues a long term view. In addition, it requires that the pension fund matches its investment strategy to its proper risk profile. The investment restrictions, which were presented in Table 10, remained unaffected. Compliance with these few regulations and the chosen strategy are supervised and approved by the technical expert and the supervisory agency, the rest is left to the discretion of the pension fund.

As mentioned above, the asset and liability management, i.e., getting the right fit between assets and liabilities, is now one of the most important aspects of risk management in pension funds. It aims to ensure that actuarial reserves are sufficiently high to meet current and future benefits. ALM concepts comprise therefore the following aspects: fair valuation of assets and liabilities, asset allocation, and compliance with external constraints.

### *7.3.4 Fair Valuation of Assets and Liabilities*

The *liability side* of the balance sheet of a pension fund consists mainly (c.f Table 35: in 2002, 92 percent) of capital related to provision of old–age insurance, disability and death. This so–called *fixed and non-fixed capital* comprises mainly accumulated old–age credit balances of the active insured, the present value of current annuities, and technical accruals to cover the risk of longevity, disability and death.

What factors (interest rates) determine the size of "fixed and non-fixed capital"? In the case of the accumulated old–age credit balances it is the MIR that controls its size (apart from the contributions of employer and employee).[77] In the case of the present value of annuities it is the so–called *technical interest rate*. While old–age credit balances are not

[77] This view is actually only correct for defined contribution plans. In the case of defined benefits plans, there is no direct effect of the MIR. This is due to the fact that the size of the individual pension depends on the last salary earned.

very sensitive to changes in the MIR in the short run, the present value of annuities is extremely sensitive to changes in the technical interest rate. The reason is that the MIR is merely applied on accumulated capital and does not affect future benefits to be paid. Thus, in the short run there are no compound interest effects.[78] Recall that the MIR is set by the Swiss Federal Council, and is not therefore directly influenced by pension funds (c.f. Section 3.2.2), but they can decide if their performance is better and – under certain conditions – if it is worse.

**Table 35 Aggregated Liabilities of all Pension Funds**

| Liabilities (in M CHF) | 2002 | in % |
|---|---|---|
| Deposits and Borrowed Funds | 11,315 | 2.72% |
| Mortgages | 1,443 | 0.35% |
| Funding Status (Schwankungsreserven) | 16,805 | 4.03% |
| Reserves of employer | 3,160 | 0.76% |
| Fixed and non-fixed Capital | 383,795 | 92.14% |
| Total Liabilities | 416,518 | 100% |

Source: Bundesamt für Statistik (2004b), p66

The technical interest rate discounts all future cash flows and enters via compound interest rate effects into the calculation of present values of annuities. Hence, these positions are highly sensitive to the choice of the exact discount factor. Responsible for the use of the technical rate is the so–called *technical expert*. In accordance with guidelines for experts in retirement pension insurance the technical interest rate should be a reasonable amount of basis points below long run market returns and take into account specific characteristics of the fund.[79] It is advisable to use a technical interest rate that is quite low. As a direct consequence, the present value of future cash flows is larger. Using a lower technical interest rate comes at the cost of a less favorable looking balance sheet (in the short run).[80] Common practice is to use a rate of 3.5 percent. High values of the technical interest rate are only sustainable when assuming a recovery of financial market returns and/or international diversification. So far, there have been no moves to adopt more objective market indicators, such as the zero-coupon yield curve on AA corporate bonds, to value future (actuarial) liabilities.

The *asset side* of the balance sheet, consisting of investments in securities (c.f. Figure 22 and Table 36 for the valuation rules), is directly affected by changes in market returns (which are exogenous for pension funds), whereas the liability side is mainly affected by the MIR and the technical interest rate, which both do not directly depend on market interest rates. *Asset Management* has therefore two particular objectives: First, the management of assets in such a way that they meet the contractual and statutory (e.g., MIR

[78] Obviously, the effect on an individual balance can be considerable, especially in the case of older members as they have already accumulated a relatively high credit balance.
[79] Keel and Frauendorfer (2003) examine the impact of the technical interest rate on the ability to take risks.
[80] As an Example: The pension fund of the City of Solothurn reduced the technical interest rate from 4.5% to 4% in the financial year 2004. As at 01.01.04, the resulting funding ratio was 78.7 percent (with a rate of 4 percent). In contrast, by still assuming a rate of 4.5%, the funding ratio would be 83.8 percent, i.e., due to increased liabilities the underfunding grew by 5 percentage points.

payments) commitments towards members. Since old–age insurance is mainly of long–term nature, investment portfolios consist therefore of a large share of fixed-income instruments (c.f. section 5.3). The second objective is to follow an absolute return strategy, to generate positive returns from which the insured can profit in the form of higher benefits (such as inflation indexing) or lower contribution rates for both employers and employees. Positive returns can be used to increase the funding status of the pension fund. Most pension funds follow a dynamic approach on the basis of existing commitments and risk capacity.

**Table 36 Valuation Rules for Pension Funds**

| **Valuation Rules:** | Comments |
|---|---|
| Fixed-Interest Securities with fixed currency and maturity:<br>- at most at face value | with a conversion right: at most at market value |
| Securities with a market value:<br>- maximal at market value | stocks, participation certificates and warrants |
| Derivatives:<br>- maximal at market value | |
| other securities:<br>- at most at face value | real securities, fixed-term deposits |
| Real estate and investments in real estate companies:<br>- at most at market value | |

Source: BVV

Table 37 presents the strategic asset allocation of some selected pension funds. (All the listed pension funds are also presented in the Appendix.) Additionally, the funding ratio, the technical interest rates (to allow for a comparison of funding ratios) and the number of total insured are given. The presented strategies differ from each other, but each pension fund invests a high fraction of its portfolio in at least one asset class (either Swiss currency bonds, foreign shares or real estate). It is likely that the chosen class represents the risk capacity of the pension fund. Almost all investment strategies are focused on global diversification and have a long–term focus. Furthermore, there are no explicit investment strategies to hedge mortality risks directly.

**Table 37 Strategic Asset Allocation of Selected Pension Funds**

| PF<br><br>Asset Classes | PFZH<br>public<br>2004 | PF SBB<br>private<br>Jun 05 | PF ABB<br>private<br>2005 | CIA<br>public<br>2002 | Contraves<br>private<br>2004 | Credit Suisse<br>private<br>2004 |
|---|---|---|---|---|---|---|
| Bonds in CHF | 25.0% | 42.0% | 37.0% | 16.5% | 11.0% | 25-60% |
| Foreign Bonds | 12.5% | 11.0% | 15.0% | 17.5% | 9.0% | " |
| Domestic Shares | 8.0% | 8.0% | 8.0% | 15.0% | 17.0% | 0-40% |
| Foreign Shares | 32.0% | 16.0% | 11.0% | 20.0% | 6.0% | " |
| Real Estate | 10.0% | 8.0% | 20.0% | 30.0% | 37.0% | 15-28% |
| Mortgages | none | 7.0% | none | none | 4.0% | " |
| Liquidity | none | 4.0% | 5.0% | 1.0% | 5.0% | 0-35% |
| Private Equities | 5.0% | 0.5% | 1.0% | none | n.a. | 0-4% |
| Commodities | 2.5% | 2.0% | none | none | n.a. | 0-5% |
| Hedge Funds | 5.0% | 1.5% | 3.0% | none | 6.0% | 0-11% |
| Foreign Currency | | | | | | 10-40% |
| Others | | | | | 5.0% | |
| Total | 100% | 100% | 100% | 100% | 100% | 100% |
| Funding Ratio | 120.0% | 83.0% | 103.2% | 62.8% | 106.7% | 112.2% |
| Technical Rate | 4% | 4% | 3.75% | 4.5% | 3.5% | 4% |
| Total insured | 39,766 | 58,931 | 15,472 | 34,928 | 3,204 | 18,510 |

Source: Individual Pension Funds

## VIII. SUMMARY AND CONCLUSIONS

Switzerland has had a long experience with a fully funded pension system. The 1985 law that mandated occupational pension coverage for all workers above a certain income merely institutionalized what had been common practice in medium and large firms before. Not surprisingly, the current structure still reflects the long history of the system, and the preferences of workers and employers with all its advantages and disadvantages. Occupational pension plans have always played, and still do play, an important role in attracting and keeping skilled and motivated workers. Annuity schemes are thus considered to be primarily a part of the labor market, but not of the financial market.

Economic, demographic and socio-economic changes during the last decades have uncovered a number of shortcomings of the system. Its structure is tailored to the needs of single-earner families under relatively stable (market) conditions. Fixed minimum interest rates and benefit conversion factors do not go along well with the large increase in life expectancy and the fall in market returns during the last decades. On the other hand, high divorce rates and a sizeable increase in the labor market participation of women have changed the desired structure of the second pillar. All these changes have led to several modifications of the law, including a greater flexibility for pension funds to set the parameters of their scheme.

The second pillar is well integrated with the PAYG first pillar with respect to the coverage of labor income. However, in the payout phase, the law does not require a minimum amount of annuitization (together with the first pillar) to prevent the elderly from outliving their savings. Beneficiaries have the right to withdraw at least 25 percent of their accumulated assets as a lump sum, even if the resulting total pension benefits fall short of the subsistence level. Although the average annuitization rate is still high at approximately 80 percent, there are very large differences across pension funds with many of them almost exclusively cashing out the old-age balances.

Approximately 80 percent of the population above 24 years is covered directly by the second pillar. The accumulated assets in the occupational pension system amount to approximately 100 percent of GDP and annual contributions to approximately 7 percent. Given the large size of the second pillar and the high effective replacement rates in old age, it is not surprising that there is little scope for an annuity market in the strict sense of a market. Market annuities make up less than one percent of pensions. They come in many different forms (most containing a minimum capital payment in case of death) and insure a highly non-representative part of the population. As a consequence we are unable to report any meaningful estimates of MWRs in the market.

A main feature of the system is a seemingly rigid legislation, coupled with the possibility for (autonomous pension) funds to deviate from the specified requirements under certain conditions. There are at least two important consequences of this approach. Firstly, the rules are usually stricter for insurance companies, notably concerning the required

funding ratio. This can be justified on the grounds that it is more difficult for the insured workers to monitor an insurance company than a pension fund directly organized by the employer (and managed by a board composed of employer, employees and retirees). But it also makes it more difficult for insurance companies to compete with the autonomous pension funds. Secondly, it is very difficult to get a good picture of what is really relevant in practice. There are literally hundreds of different schemes with large differences with respect to the structure of old age credits (including the degree of the super-mandatory part), their practice and conditions of annuitization at various ages, as well as the fund's asset and liability management and risk strategy (mirrored in the organization structure).

As had been mentioned above, the main regulatory issues concern the minimum interest rate during the accumulation period, and - even more importantly - the annuity conversion factor at which the accumulated assets have to be translated into a life-long annuity. A major problem is that the requirements are not rule-based and thus are not automatically adjusted to changing market conditions and increases in longevity. As a consequence, the rules are susceptible to political pressure, and a too sluggish response to a changing environment leading to potential financial problems for the pension providers.

The rationale for minimum standards in the Swiss system is a high emphasis on the stability of pension benefits across different cohorts. As a consequence of the conversion factor philosophy, the annuity rate risk is basically non-existent. This would not be a problem *per se*, if the legal requirements were based on prudent estimates of long-run market conditions and mortality rates leading to Money's Worth Ratios that were in line with the financial sustainability of the system. Current political initiatives seem to go into the direction of maintaining the popular stability aspect of the system (basically hedging pensioners from an annuity risk), but also taking into account the projected increases in longevity and the fall in the long-run market interest rate.

The computation of money's worth ratios in the occupational pension scheme is complicated by a number of specificities of the Swiss system: Firstly, pension funds can deviate from the legal conversion factor under certain conditions. The reported MWRs thus constitute an upper bound for the annuities' values. Secondly, it is difficult to integrate the existing forms of inflation indexing. Almost all funds use conditional indexing in the spirit of "if the financial situation of the pension fund allows it". Moreover, as there are no inflation indexed bonds in Switzerland, the discounting is somewhat tricky. Thirdly, the discounting itself constitutes a major problem. By using the nominal yield curve, one ignores the fact that higher returns can be achieved at relatively low costs (in terms of additional risks), due to the still substantial interest rate differential with respect to other countries. Again, the reported MWRs are possibly too high. The values computed by the customary technical interest rate (which should reflect long-run market returns), which is applied in most pension funds, is also open to critique.

Despite the seemingly high conversion factors, more than 90 percent of pension funds report funding ratios above 100 percent. However, the reported funding ratios may result from an understatement of pension liabilities because of the use of high technical discount rates in calculating their present value. Since the crisis in the early 2000s, the

financial situation has improved in most funds. One reason for this finding might be that the MWRs computed with the nominal yield curve overestimate the true MWRs as argued above. Many pension providers claim that the realized return on the assets had been well over the minimum interest rate, allowing for the financing of “excess benefits” and an accumulation of reserves. Nonetheless, it is not easy to generalize this result due to the high variance in the realized returns across pension providers.

Pension funds under public law that enjoy an explicit warranty from the cantonal or federal authority are in a much more delicate financial situation, with many of them well below a sufficient funding level. This demonstrates that incentives matter a lot more than investment regulations (which are the same for all legal forms of pension funds).

Transparency has been an important policy issue in the Swiss occupational pension scheme, a problem exacerbated by the large fragmentation of the system. The new transparency requirements make it much easier for insured individuals to assess the performance and standing of their pension provider. It also facilitates the supervision of the system, although the large differences between the providers still complicates a standardized assessment of the pension funds. It also seems as if some internal mechanisms (notably the structure of governance of the pension funds) have compensated for the lack in transparency and insufficient supervision in the past.

It is not easy to draw conclusions for other countries. The history of old-age provision and the structure of the labor market are very important for the successful implementation of any system. Nonetheless, two big risks can be identified that should be borne in mind in setting up an annuity scheme. The first is an explicit guarantee of the state that seems to lead to excessive risk taking and to generous benefits. If the second pillar is large enough as in the Swiss case, this constitutes a big threat for public finances. The second, and equally important, risk stems from an inadequate regulation of the scheme. If the rules are not adjusted to market conditions and demographic changes in some standardized way at least in the medium run, they will become a punch ball of politics and may thus threaten the viability of the pension funds and the equitable treatment of different generations.

## Appendix: Structure and Performance of Selected Pension Funds

This appendix examines in greater depth a number of selected pension funds. The aim is to provide the reader with information on pension funds that are different from each other. Each pension fund is described first by its most specific characteristics. Afterwards, the focus is on their early retirement schemes and on their investment strategies.

Regarding early retirement, there are no rules on that issue in the BVG. Within their financial limits pension funds are free to define specific benefits in their own pension fund rules. Early retirement conditions differ considerably across pension funds. Recall that pension benefits are defined by total *accumulated credit balances* at retirement and by the *conversion factor*. Due to a shorter period of contribution and interest payments the credit balances are smaller for an earlier exit out of the labor market. Pension funds also reduce the conversion factors to counteract the effects of the increased period of retirement over certain age spans. Some pension funds offer a bridging pension until the statutory AHV retirement age is reached. This bridging pension is repayable, but is also often subsidized by the plan sponsor.

### Examples of Pension Funds

#### PF City of Zürich[81]

*The pension fund of the city of Zürich was founded in 1913. Since 2002, it is organized as a foundation under public law and covers approximately 25,000 active contributors and 14,000 retirees. It is now a defined contribution plan, and up to 50 percent of the accumulated capital can be withdrawn as a lump sum. Retirement is possible from the age of 58 onwards. The pension fund of the city of Zürich is very healthy, i.e., its funding degree equals approximately 120 percent. The technical interest rate used in computing the liabilities was 4 percent in 2005. (Following the advice of the technical expert the interest rate will be reduced to 3.5 percent over the next 2 years.) Furthermore, it has a transparent structure, including a web page that contains all the relevant information.*[82]

Early Retirement: At the pension fund of the City of Zürich the insured individuals are eligible for early retirement from age 58 onwards. The pension on early retirement is calculated on the basis of the savings at the time of retirement and the applicable conversion rate. The corresponding rates are listed in the table below (year 2005) and are valid for both women and men. Compared to the conversion factor of 7.15 percent as specified by law (c.f. Table 13), this pension fund uses lower rates even at the statutory retirement age of 65. This is compensated by subsidies for the AHV/AVS replacement benefits and inflation indexation.

[81] c.f. Pensionskasse Stadt Zürich (2004)

[82] We would like to thank Dr. Vera Kupper, head of the investment group and member of the executive board of the "Pensionskasse der Stadt Zürich" for valuable insights and information.

**Table 38 PF City of Zurich: Early Retirement Ages and Conversion Factors, 2005**

| Retirement Age | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 |
|---|---|---|---|---|---|---|---|---|
| Conversion Factor (in %) | 6.89 | 6.72 | 6.56 | 6.42 | 6.28 | 6.15 | 6.02 | 5.90 |

Source: Pensionskasse Stadt Zürich (2004), p.26, Tab. 3

The bridging pension may equal up to the maximal amount payable under the AHV/AVS. As a consequence, the accumulated old–age credit balance is reduced by the present value of the bridging pension less the part that is sponsored by the employer. The reduction can be compensated by a lump–sum payment.

Investment: The investment strategy of the pension fund of the City of Zürich is focused on a high long run return on assets and global diversification. The assets are chosen in a way as to benefit from the global real economic growth. As a consequence, the portfolio (at 31.12.04) contains a high fraction of foreign shares (33.7 percent)[83] , in particular from emerging markets, but also hedge funds (4.6 percent) and private equities (1.9 percent). Other instruments are domestic currency bonds and foreign bonds (27.4 percent and 12 percent, respectively), domestic shares (8.2 percent), real estate (9 percent), and commodities (2.2 percent). The investment strategy is complemented by a relatively high level of reserves.

Common with most other pension funds, there are no explicit investment strategies to hedge mortality risks directly. The accrued liabilities computed with constant mortality tables are augmented by 0.5 percent each year. FIF mortality tables are used.

**PF SBB (Swiss National Railways)[84]:**

*The pension fund of the Swiss national railway company (SBB) was founded in 1906. Since 1999, it is organized as a foundation under private law. It covers almost 28,000 active contributors and over 30,000 retirees, from 12 affiliated companies. The majority of the insured are organized in a defined benefit system. This system covers insured incomes up to 100,000 CHF. The maximum pension equals 60 percent of the last insured income. Early retirement is possible from the age of 58 years onwards. Up to 50 percent of the capitalized pension can be withdrawn as a lump sum. Income above the level of 100,000 CHF is managed in a defined contribution system, where up to 100 percent of the accumulated capital can be withdrawn as a lump sum. With total assets amounting to 11.5 billions CHF in 2004, the pension fund of SBB is one of the biggest pension funds. Since liabilities related to old–age benefits - computed with a technical interest rate of 4 percent - exceed total assets by 2.3 billions CHF the funding ratio is only slightly above 83 percent, which is considered as a heavy underfunding.*

Early Retirement: Early retirement at SBB is possible at age 58. The ordinary pension is proportional to the length of the contribution period. For each year of contributions the pension increases by 1.5 percent of the insured wage, but it cannot exceed 60 percent (=40*1.5%). Early retirement between 62 and 65 does not result in a reduction of

[83]This number exceeds the 25 percent specified in the law. The reason is that investment requirements do not bind in the non-mandatory part of the scheme.
[84]c.f. Pensionskasse SBB (2004)

the pension, if the number of contribution years is at least 40. In the case of retirement between 60 and 62 the pension is reduced by 0.2 percent per month and between 58 and 60 by 0.5 percent per month (given the 40 years of contribution). An overview is given in the following table.

**Table 39 PF SBB: Early Retirement and Pension Benefits, 2005**

| Retirement Age | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 |
|---|---|---|---|---|---|---|---|---|
| Pension in % of insured wage | 100.0% | 100.0% | 100.0% | 100.0% | 97.6% | 95.2% | 89.2% | 83.2% |

Source: Pensionskasse SBB (2004), p.12

The bridging pension equals up to the maximal amount payable under the AHV/AVS. The repayment starts at the ordinary AHV/AVS age and is charged against the annuity payments. For the period of age 60 to age 65 the bridging pension is subsidized by the employer. This does not hold for the bridging pensions before age 60.

Investment: The asset management invests the old–age credit balances with a long–term focus and well diversified. The investment horizon extends over a period of 10 to 15 years. Taking into account their ability to take risks, they assume a return on investment of 4.5 percent. As at 31.03.05, the portfolio comprised a high fraction of bonds issued in CHF (46 percent). Foreign bonds (11 percent), domestic shares (9.9 percent), foreign shares (16.8 percent) and mortgages (7.7 percent) were among other important asset classes apparent in the portfolio. For the period 31.12.04 to 31.03.05, the return on investment was 1.95 percent, whereas the benchmark performed at 2 percent.

**ABB Pension Fund[85]:**

*The pension fund that is set up for employees of ABB is organized in the form of a foundation. Economically or financially associated companies can join the pension fund. The ABB pension fund accounts for more than 7 thousand active insured and slightly more than 8 thousand retirees in total. The old–age insurance system is organized in the form of defined contributions, where the member can choose among three different types: Standard (i.e., same contributions of employer and employee), Standard plus (i.e., higher contributions of employee), and Standard minus (i.e., higher contributions of employer). Early and late retirement is possible, but not earlier than at age 57 and not later than at age 70, respectively. Retirement benefits can be drawn in the form of pensions, or in the form of a capital payment, or as a mixture of both. The risk insurance (i.e., invalidity and death) is organized in the form of defined benefits, where the contributions are fully paid by the employer. The asset side of the balance sheet accounts for 3.2 billions CHF, which covers liabilities related to old–age benefits at a rate of 103.2 percent. The liabilities were computed by using a technical interest rate of 3.75 percent.*

Early Retirement: At ABB, members may at their request retire from the age of 58

[85] c.f. ABB Pension Fund (2005)

years onwards, or may postpone retirement until age 70. The corresponding conversion rates are listed below (year 2005).

**Table 40 PF ABB: Early Retirement Ages and Conversion Factors, 2005**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Retirement Age | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 |
| Conversion Factor | 7.10 | 7.10 | 7.10 | 7.10 | 6.82 | 6.58 | 6.36 | 6.14 | 5.97 |
| | | | | | | | | | |
| Retirement Age | 66 | 67 | 68 | 69 | 70 | | | | |
| Conversion Factor | 7.24 | 7.39 | 7.54 | 7.69 | 7.84 | | | | |

Source: ABB Pension Fund (2005), p. 28

The bridging pension corresponds to the maximum AHV/AVS retirement pension and is fully repayable.

Investment: The investment strategy of the ABB pension fund was tracking an index[86], i.e., all purchases and sales aimed at reproducing a given market index. Thus, this strategy should achieve the market return. Consequently, participating in higher market returns is not possible. On the other side, the risk of achieving a lower return is mitigated. From the above strategy are deviating the investments in the Swiss money market, in domestic bonds, in emerging market shares, and in private equity. These securities are managed more actively. Generally, all the securities are managed by a specific and specialized institution that is supervised by the foundation board. The portfolio (as at 31.12.04) contained a high fraction of bonds issued in CHF (36.4 percent) and real estate (20 percent). Foreign bonds (14.7 percent), domestic and foreign shares (8 percent and 11 percent, respectively), money holdings (5 percent), private equity (1.6 percent), and hedge funds (3.1 percent) complete the portfolio. The return on investments was 4.67 percent in 2004.

**PF Oerlikon Contraves AG[87]:**

*The pension fund of Oerlikon Contraves provides old-age benefits to its employees and economically or financially associated companies. Old–age and risk insurance are funded by defined contributions, where both the employer and the employee pay the same amount. From the age of 60 onwards, members may at their request take early retirement. Additionally, the option of a full or partial capital payment exists. In 2004, this pension fund covered 1084 active contributors and 2120 retirees with old–age insurance. Despite the fact that the majority of the insured are retirees, the pension fund is quite healthy. Since 2002, the funding ratio has been increasing again, and reached 106.7 percent in 2004. Thereby, a technical interest rate of 3.5 percent was applied. As at 31.12.04, total assets amounted to 1.2 billions CHF.*

Early Retirement: Employees of Oerlikon Contraves can chose the early retirement option at age 60. The corresponding conversion factors (year 2005) are:

[86] in 2001

[87] c.f. Pensionskasse der Oerlikon Contraves AG (2005)

**Table 41 PF Oerlikon Contraves AG: Early Retirement Ages and Conversion Factors**

| Retirement Age | 65 | 64 | 63 | 62 | 61 | 60 |
|---|---|---|---|---|---|---|
| Conversion Factor (in %) | 6.75 | 6.60 | 6.45 | 6.30 | 6.15 | 6.00 |

Source: Pensionskasse der Oerlikon Contraves AG (2005), p.7

The bridging pension equals the amount of the ordinary retirement pension payable under the AHV/AVS. Consequently, the accumulated old–age credit balance is reduced by the present value of the bridging pension.

*Example*: A man retires at age 62, his old–age credit balance at age 62 equals to 650,000 CHF and he asks for a bridging pension of the maximum AHV/AVS retirement pension, i.e., 25,800 in 2005.

| | |
|---|---|
| Reduction in the credit balance: | 650,000 - 25,800*2.855 = 576,341 |
| Reduced Pension: | 576,341*0.063 = 36,310 |
| Total Annuity Payment (from 62 to 65) | 36,310 + 25,800 = 62,110 |
| Total Annuity Payment (at age 65) | 36,310 + ordinary AHV/AVS pension |

Investment: The investment in securities follows a strategy with predefined weights, which are orientated on diversification. Additionally, to also participate in short– and medium–term market developments, a deviation margin from the fixed weights is defined. As a consequence, shares were increased (due to the positive market trend) and bonds were sold (due to unfavorable interest rates) in 2004. The management of securities is partly delegated to a specific and specialized institution, i.e., 65 percent are managed externally and the remaining 35 percent are managed internally. At 31.12.04 the biggest balance in the portfolio was real estate (35.9 percent), followed by bonds (17.2 percent), shares (17.2 percent) and other investments (29.8 percent). The return on investment was 6.4 percent. This was above the benchmark return of 5.5 percent.

### CIA[88]

*The pension fund of the employees of the canton Geneva was founded in 1929. Like other public pension funds it adopted a defined benefit system. In the best case, retirees are eligible for a rate of 75 percent of the last insured wage. Members that contributed for at least 25 years are eligible for early retirement at age 50. In all other cases, early retirement is possible at most 5 years before the ordinary retirement age. Retirement benefits are normally drawn in the form of pensions. The capital payment option is only available if pensions are small. In 2003, the CIA insured over 25,000 active contributors and almost 10 thousand retirees and its total assets were 4.9 billions CHF. In line with other public pension funds, the CIA exhibits a large underfunding. In 2002, its funding ratio decreased by 10 percent to 61.1 percent. Due to the good financial year 2003, the funding ratio rose slightly to 62.8 percent. To calculate future liabilities a technical interest rate of 4.5 percent was assumed.*

Early Retirement: The early retirement scheme at CIA is a function of the age of the retiree and the length of the contribution period. The pension increases in both arguments, but it cannot exceed 75 percent of the last insured wage. In addition, the two arguments are

[88]c.f. CIA du Canton de Genève (2002)

positively correlated, i.e., for each year of contributions the pension increases according to the following table.

**Table 42 CIA: Early Retirement and Pension Benefits**

| | | | | | |
|---|---|---|---|---|---|
| Retirement Age | 57 | 58 | 59 | 60 | 61 |
| Increase in pension (as % wage) | 1.68 | 1.74 | 1.80 | 1.86 | 1.91 |
| Retirement Age | 62 | 63 | 64 | 65 | 66 |
| Increase in pension (as % wage) | 1.97 | 2.03 | 2.09 | 2.15 | 2.21 |

Source: CIA du Canton de Genève (2002), p. 48

The bridging pension equals up to the maximal amount payable under the AHV/AVS. The repayment starts at the ordinary AHV/AVS age or before, on a voluntary basis.

Investment: The investment strategy is focused on long run returns. In 2001, it additionally focused on global diversification of stocks. As a consequence, Swiss shares were reduced and European shares were bought in 2002. Another special characteristic of the investment strategy is the fact that the whole portfolio was actively managed (with only one exception). As a result of the bad performances of actively managed mandates, the pension fund changed this strategy in 2003. Consequently, part of the portfolio was invested in passively managed mandates. The management of all securities is delegated to a specific and specialized institution. As at 31.12.2003 the portfolio contained a high fraction of real estate (33.2 percent) and bonds issued in CHF (18 percent). Foreign bonds (13.9 percent), domestic shares (14.2 percent), foreign shares (14.3 percent), and money holdings (6.4 percent) were the remaining investments. The returns on investment before and after deductions for value fluctuation reserves were 8.39 percent and 5.12 percent, respectively.

**PF of Credit Suisse Group[89]:**

*The Pension fund of Credit Suisse Group (Switzerland) ensures its employees and those from companies that are legally or commercially closely associated with Credit Suisse Group. The annuity plan is a defined benefits scheme. The insured is entitled to a retirement pension from the age of 55. A bridging pension until attainment of the ordinary retirement age is only possible if the event of retirement after the 60th birthday. Without providing any reasons the insured can request a lump sum payment of up to 50 percent of the capitalized annual pension. In 2004, the pension fund of Credit Suisse accounted for almost 19,000 insured. Thereof were almost 8,500 retirees. The funding ratio at year–end (2004) was 112.2 percent. The underlying total assets amounted to almost 9 billion CHF.*

Early Retirement: Individuals who work for Credit Suisse are eligible for early retirement at age 55. Pension payments that are drawn before attainment of the ordinary retirement age will be reduced for each month according to the following table:

[89]c.f. Pension Fund of Credit Suisse Group (Schweiz) (2005)

**Table 43 PF Credit Suisse Group: Early Retirement and Pension Benefits**

| Retirement Age | 62-63 | 61-62 | 60-61 | 59-60 | 58-59 | 57-58 | 56-57 | 55-56 |
|---|---|---|---|---|---|---|---|---|
| Monthly Reduction | 0.250% | 0.250% | 0.250% | 0.333% | 0.417% | 0.500% | 0.583% | 0.667% |
| Annual Reduction | 3.0% | 3.0% | 3.0% | 4.0% | 5.0% | 6.0% | 7.0% | 8.0% |

Source: Pension Fund of Credit Suisse Group (Schweiz) (2005), p.14

Contrary, if the pension payments are postponed beyond the 65th birthday, the retirement pension will increase by 0.25 percent for each additional month at work. Early retirement *after* the age of 60 implies a bridging pension, which equals the amount of the retirement pension, but shall not exceed 50 percent of the maximum retirement benefits payable under the AHV/AVS. This bridging pension does not cause any reduction and can be considered as "for free". In addition, the insured can *purchase* an additional bridging pension. This purchased bridging pension causes a reduction of the retirement pension (according to the above table). The reduction, which can be compensated, equals to 5 percent of the additional bridging pension . However, the total amount of the bridging pension cannot exceed the maximum retirement pension payable under the AHV/AVS.

Investment: The investment strategy is focused on long–term asset allocation. The Board of Trustees defines a strategic range for different asset classes and the representative benchmark. The tactical investment range for securities (which lies within the strategic investment range) is defined on a quarterly basis. The chief strategy thereby is *Timing* and *Selection*. The asset allocation as at 31.12.2004 is the following: Swiss bonds (36.2 percent), direct and indirect real estate (14.8 percent and 4.1 percent, respectively), liquidity (12.5 percent), foreign and convertible bonds (9.3 percent and 1.7 percent, respectively), foreign equities (7.7 percent), Swiss equities (6.5 percent), hedge funds (5.6 percent), and private equity (1.6 percent). The performance of the above assets was 5.1 percent.

### PF City of Solothurn[90]

*The pension fund of the city of Solothurn is an institution under public law and insures 362 active contributors and 274 retirees. It uses as pension plan a defined benefit system, where the employer contributes 60 percent (i.e., 13.65 percent of the insured wage per annum) and the employee the remaining 40 percent (i.e., 9.1 percent of the insured wage per annum)o. The contributions to term insurance are equal for both parties (i.e., 1 percent of the insured wage per annum). Pension benefits are paid in the form of annuities and reach maximal 60 percent of the last insured wage. The accumulated capital can only be withdrawn as a lump sum for low income levels. The retirement age can be postponed in both directions by 5 years. In 2003, the guaranteed (by the employer!) interest rate on the old–age credit balances was 4.5 percent and in 2004 it was 4 percent (due to the decrease of the technical interest rate from 4.5 percent to 4 percent it was adjusted accordingly). As at 31.12.03, total assets were 108 million CHF and the funding ratio - using 4.5 percent as the technical interest rate - was 83.8 percent. As a consequence of the reduced technical interest rate the funding ratio decreases to78.7 percent.*

[90] c.f. Pensionskasse der Stadt Solothurn (2005)

Early Retirement: Employees of the City of Solothurn can retire 5 years before the ordinary retirement age. Their pension, which equals at most 60 percent of the last insured wage (i.e., with 40 years of contribution), is reduced according to the following table:

**Table 44 PF City of Solothurn: Early Retirement and Pension Benefits**

| Retirement Age | 65 | 64 | 63 | 62 | 61 | 60 |
|---|---|---|---|---|---|---|
| Reduction per year | - | 9% | 8% | 7% | 6% | 5% |
| %-Reduction of the annuity | 0% | 9% | 17% | 24% | 30% | 35% |

Source: Pensionskasse der Stadt Solothurn (2005), p.55

The bridging pension equals at the best, the maximal amount payable under the AHV/AVS. The corresponding reduction of the annuity payments amounts to 6.8 percent of the drawn bridging pension. In the case of late retirement the pension increases each month by 0.567 percent.

Investment: The investment strategy is of long–term nature and optimized with respect to the risk capacity of the pension fund. Depending on the type of securities, the investment management is handed over to a specific bank. In 2003, the largest positions in the overall portfolio were domestic currency and foreign currency bonds (31.4 percent and 19.5 percent, respectively), followed by mortgages (12.6 percent). Foreign shares (9.4 percent), Swiss shares (9.3 percent) real estate (8.1 percent), estate funds (5 percent), and hedge funds (1.7 percent) complete the investment in securities. The remaining fraction is held in cash (3 percent).

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